Adverse Events in Traditional Korean Medicine:
A Result from Survey of 2000 Korean Individuals

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Abstract

**Background:** Few studies exist on the adverse effects of traditional medicinal therapies in Korea from either the national public pharmacovigilance system or the academic community. The aim of our study was to determine the incidence and status of the adverse effects of traditional medicine, including herbal medicines and other traditional therapies.

**Methods:** Among 2,000 individuals selected from the general Korean population, 915 had taken herbal medicine or had received traditional medicinal therapies; these individuals were surveyed by mail for the number of times they were treated, the frequency of adverse reactions, and the symptoms of their adverse reactions.

**Results:** In the general public, 8.2% of individuals have experienced some type of adverse effects from traditional medicines or treatments. The main causes of the adverse effects were acupuncture and herbal medicines, and the main types of adverse effects experienced were diseases of the digestive system and skin. The incidence of adverse effects was less than 3.7% for acupuncture and 3.8% for herbal medicine. Overall, the incidence rate of adverse effects for traditional medicinal therapies for the entire population was 0.04 per 10,000 individuals.

**Conclusion:** The national pharmacovigilance system is in need of policies and regulations to enhance the reporting of adverse effects not only for herbal medicines but also for traditional medicinal therapies such as acupuncture, moxibustion, cupping therapy, physical therapy, and chiropractic therapy. Furthermore, surveys of individuals receiving traditional medicinal therapies on a regular annual basis are necessary to assess the overall incidence of adverse effects.
Background

Recently, the interest in complementary and alternative medicine (CAM) has been increased in the clinical settings of many countries, and herbal medicines and acupuncture have become globally popular therapies [1, 2]. Herbal medicines have been used in the clinics of China, Korea, and Japan for thousands of years, and the toxicity and efficacy of herbal therapies have been well established in the literatures. These studies have become important sources of knowledge and techniques for treating intractable diseases [3]. However, the largest problems of CAM are the lack of a sufficient scientific basis for establishing efficacy as well as questions that have arisen about safety with the increasing use of CAM.

Traditional Korean medicine (TKM), which is one part of CAM, faces similar problems. The first time that a case involving the adverse effects of herbal medicine was reported at a conference in South Korea in 1979 and involved a child who suffered lead poisoning and acute lead encephalopathy following treatment [4]. Adverse effects of traditional medicinal therapies were first reported among the professional societies for Chiropractic therapy in 1998 and for acupuncture in 2006 [5, 6]. However, there have been almost no additional reports of adverse effects from these treatments since the previously mentioned reports.

The Korean government first established regulations for pharmacovigilance in the national public healthcare system in 1988, requiring that all drug side effects be reported according to the regulations [7]. In 2006, 2007, and 2008, the total numbers of reported drug side effects in South Korea were 2,467, 3,750, and 7,210, respectively. Of these reports, only eight cases of adverse effects were reported by herbal medicines in 2007 and 2008 and no other cases were reported after that [8, 9].
In 2008, 14,818 TKM doctors in South Korea treated a total of 12,128,657 patients with herbal medicines that were reimbursable by the national health insurance system. These therapies included 56 types of herbal formulations and 68 types of single herbal crude extracts as well as traditional therapies such as acupuncture, moxibustion, cupping therapy, and other traditional diagnostic instruments [10].

The current pharmacovigilance system does include a method for the self-reporting of adverse effects from herbal medicines, but there are no systems in place for monitoring and reporting adverse effects from other traditional therapy methods. Any adverse effects that occur can only be determined from publications by relevant experts. Thus, there are currently no methods for assessing the number of adverse effects arising from herbal medicines or other traditional therapies in South Korea.

Recognising the increasing interest in traditional therapies among the public, this survey aims to assess experience about the adverse events of traditional Korean medicine in Korea.
Methods

In 2008, 2,000 men and women over the age of 20 (38,078,786 individuals out of the total population of 50,001,057) were divided into age groups based on proportions within the general South Korean population; they were also divided into 16 administrative districts. Of the 2,000 individuals sampled, 1,771 were surveyed online, while the 229 individuals in their 60s who were unfamiliar with online surveys were interviewed individually. The surveys were conducted between December 1 and December 17, 2008. The 1,085 (54.2%) individuals who did not have any experience with traditional medicine in 2008 were excluded. The remaining 915 (45.8%) individuals who had experience with traditional medicine in 2008 were surveyed for the development of adverse effects from traditional medicinal therapies according to the type and number of therapies received and depending on gender and age. The symptoms of adverse effects were classified into five groups: diseases of the digestive system, diseases of the skin, diseases of the nervous system, disorders of the kidney, and others. The survey results were processed using SPSS WIN 12.0K. The weighted application analysis model NIREX-P method was applied, and the two-step cluster method was used for analysis (sampling error ±2.2 with a confidence interval of 95%).
Results

Usage of traditional medicinal therapies

Of the initial 2,000 individuals surveyed, only 45.8% (n=915) had received TKM including herbal medicines, acupuncture, moxibustion, cupping therapy, physical therapy, or chiropractic therapy in the previous year. More females (53.6%, n=490) used these therapies than males (46.4%, n=425). Among the different age groups, therapy usage varied: 26.7% of those in their 30s (n=244) used traditional therapies, as did 25.0% of individuals in their 40s (n=229), 21.2% of individuals in their 20s (n=194), and 17.3% of individuals in their 50s (n=158) and 9.8% of individuals in their 60s (n=90). In terms of the frequency of usage, 73.8% (n=675) used traditional therapies fewer than 5 times per year, 13.1% (n=120) used them 6 to 10 times per year, and 13.1% (n=120) used them more than 11 times per year.

The rates of usage for each traditional therapy as a proportion of the 2,000 individuals surveyed were as follows: acupuncture, 36.7% (n=733); herbal medicine, 13.4% (n=267); physical therapy, 10.0% (n=200); moxibustion, 9.0% (n=179); cupping therapy 5.7% (n=113); chiropractic therapy, 1.5% (n=30); and other therapies, 0.5% (n=10) in Korea.

The 915 people who took traditional therapies had received combination therapies. Acupuncture was the most commonly repeated therapy at 80.1% (n=733), followed by herbal medicines (29.2%, n=267), physical therapy (21.9%, n=200), moxibustion (19.6%, n=179), cupping therapy (12.4%, n=113), chiropractic therapy (3.3%, n=30), and other therapies (1.1%, n=10).

Of the 425 males, 80.2% (n=341) received acupuncture, 24.5% (n=104) took herbal medicines, 21.6% n=92) received physical therapy, 19.2%(n=82) received moxibustion, 13.8%
(n=59) received cupping therapy, and 3.9% (n=17) received chiropractic therapy. Of the 490 females, 80.1% (n=392) received acupuncture, 33.2% (n=163) took herbal medicines, 22.2% (n=108) received physical therapy, 19.9% (n=97) received moxibustion, 11.1% (n=54) received cupping therapy, and 2.7% (n=13) received chiropractic therapy. The gender distribution for the use of each therapy was as follows: females consisted of 53.5% (392/733) of total acupuncture users, 61.0% (163/267) of herbal medicine users, 54.0% (108/200) of physical therapy users, and 54.2% (97/179) of moxibustion users, all of which showed higher usage than males. However, males represented 52.2% (59/113) of the cupping therapy users and 56.7% (17/30) of the chiropractic therapy users compared to women.

As for the age group distribution, 78.1% (n=152) of a total of 194 individuals in their 20s received acupuncture and 30.9% (n=60) took herbal medicines. For the 244 individuals in their 30s who were surveyed, 77.2% (n=188) received acupuncture and 31.8% (n=78) took herbal medicines. Of the 90 seniors in their 60s, 90.0% (n=81) received acupuncture and 45.3% (n=41) took herbal medicines; both rates were higher than in any other age group.

As for the type of therapy, of the 733 total acupuncture cases, the predominant recipients were people in their 30s (25.7%, n=188) and 40s (24.8%, n=182). The 267 cases of herbal medicine, 29.2% (n=78) were for people in the 30s. For the 200 cases of physical therapy, 28.0% (n=56) were for people in their 30s. For the 179 cases of moxibustion, 26.8% (n=48) were for people in their 40s. For the 113 cases of cupping therapy, 35.4% (n=40) were for people in their 30s. For the 30 cases of chiropractic therapy, 30.0% (n=9) were people in their 40s, who were the most frequent recipients of this therapy.

Of the total cases for each therapy, the percentage of individuals receiving 5 or fewer
treatments of TKM were 71.6% (525/733) for acupuncture, 73.8% (197/267) for herbal medicines, 75.5% (151/200) for physical therapy, 68.7% (123/179) for moxibustion, 68.1% (77/113) for cupping therapy, and 70.0% (21/30) for chiropractic therapy (Table 1).

Adverse events from traditional medicinal therapies

The 915 individuals included in this study received a total of 1,532 TKM treatments. When asked about experience of the adverse effects, 91.8% (n=840) reported no adverse effects and 8.2% (n=75) reported experiencing adverse effects. The types of adverse effects included diseases of the digestive system (40.0%, n=30), skin (30.6%, n=23), nervous system (14.6%, n=11), kidney (6.6%, n=5), and others (7.9%, n=6).

Of the 425 males surveyed, 91.3% (n=388) reported no adverse effects and 8.7% (n=37) reported adverse effects. Of the 490 females, 92.1% (n=452) reported no adverse effects and 7.9% (n=39) reported adverse effects. In terms of the type of adverse effect experienced, diseases of the digestive system (43.2%, n=16) and skin (37.8%, n=14) were predominate in males. For females, diseases of the digestive system (36.8%, n=14), skin (23.7%, n=9), and nervous system (23.7%, n=9) were the most common.

Individuals in their 20s experienced the highest rate of adverse effects at 10.3% (n=12), while individuals in their 60s had the lowest rate at 4.4% (n=4). For those experiencing adverse effects, the age distribution was as follows: 26.7% (20/75) of 20-year-olds had adverse effects, as did 28.0% (21/75) of 30-year-olds, 20.0% (15/75) of 40-year-olds, 20.0% (20/75) of 50-year-olds, and 5.3% (4/75) of 60-year-olds. The most common type of adverse effect for each age group was as follows: diseases of the digestive system for 20-year-olds (60.0%, n=12), diseases of the skin for 30-year-olds (38.0%, n=8) and 40-year-olds (40.1%, n=6), diseases of
the digestive system for 50-year-olds (60.2%, n=9), and diseases of the skin for 60-year-olds (76.0%, n=3).

The increased use of traditional therapy also led to an increase in adverse effects, as the rates of adverse effects were 7.7% (n=52) in those receiving 5 or fewer treatments, 8.3% (n=10) in those receiving 6 to 10 treatments, and 10.8% (n=13) in those receiving 11 or more treatments. The most common type of side effect for each group was as follows: diseases of the digestive system (44.2%, n=23) for individuals receiving 5 or fewer treatments, diseases of the skin (60.0%, n=6) for those receiving 6 to 10 treatments, and diseases of the digestive system (38.4%, n=5) for those receiving 11 or more treatments (Table 2).
Discussion

In this study, we observed that out of 2,000 Korean adults, only 45.8% had any experience with TKM therapies within the previous year although this is much higher than the 11.5% rate observed in Korean children aged 0 to 18 years [11], indicating in Korea, adults use TKM at a higher rate than children. In addition, the rate of acupuncture use in Korea is 36.7%, which is much higher than rates in the UK (1.6%), the US (1.1%), and Japan (6.1%) [12]. Approximately 70% of the individuals who had used TKM used it 5 or fewer times compared with approximately 10% who used it 6 to 10 times or 11 or more times, demonstrating that the long-term treatment rate was low. Specifically, in both the groups receiving 6 to 10 treatments and 11 or more treatments, the percentages of individuals receiving acupuncture and herbal medicines were only 19.8% and 17.8%, respectively, which contrasts with the rate observed for the group receiving 5 or fewer treatments.

Among Koreans over 20 years of age who participated in this study, 8.2% experienced adverse effects from traditional medicines or treatments. That is higher than the rate of adverse effects of 0.27% reported for CAM in Korean children aged 0 to 18 years [11].

Acupuncture, moxibustion, cupping therapy, physical therapy, and chiropractic therapy work by stimulating or applying pressure to the skin, muscles, or skeleton of the human body and can cause adverse effects such as diseases of the skin and nervous system. The representative adverse symptoms from these therapies include pain or itching, burning, bleeding or hematoma, and paralysis. For herbal medicines that are administered orally, the digestion, absorption, metabolism, and excretion of the medicine can cause adverse symptoms of the digestive and kidney systems such as stomachache, jaundice, liver failure, and edema of the face, hands, and feet.
The 915 individuals surveyed received a total of 1,532 treatments within the previous year. Of these treatments, the most frequently used therapies were acupuncture (80.1%, n=733) and herbal medicines (29.2%, n=267). These therapies can therefore be considered the main causes of the adverse effects observed.

Diseases of both the skin and nervous system were observed as symptoms of adverse effects resulting from acupuncture. When measured based on the frequency of incidence (n=34) of the two diseases, the rate of adverse effects to acupuncture treatment was 3.7%, which is lower than the rates reported in any other country. According to a review of the reported results in databases, the literature, and randomized clinical trials from different countries that are comparable to Korea, the rates for adverse effects were 11.8% in Canadian children, 8.6% in Switzerland, and 6.71% to 15% in China [13-15]. Additionally, when the total incidence rate for adverse effects in the general population of South Korea was calculated based on the rate of 3.7% found in this study, the rate was 0.04 per 10,000, which is lower than the rate of 0.55 per 10,000 reported in the US [16].

Studies in China have reported that the rate of adverse effects from acupuncture depends on age and gender, with older age groups and males having higher rates of adverse effects than females [17]. In Japan, younger age groups and females were more sensitive to needle stimulation, while elders were better able to tolerate pain [12]. In the current study in Korea, it was shown that the rate of adverse effects was not correlated with age; however, males had a higher incidence of diseases of the skin, while females had a higher incidence of diseases of the nervous system.
As for the relationship between the frequency of acupuncture treatment and adverse effects, of the 33 reported cases of adverse effects, 66.6% (22/33) were from the group receiving 5 or fewer treatments, 21.2% (n=7) were from the group receiving 6 to 10 treatments, and 12.1% (n=4) were from the group receiving 11 or more treatments. These results show that more adverse effects occurred earlier in treatment and fewer in later treatments. We can speculate that this is because if adverse effects are experienced after the first treatment, people will usually discontinue treatment.

In this study, the main adverse effects resulting from acupuncture were itchiness, bleeding or hematoma, and paralysis; these results are similar to those reported in other studies. The adverse effects reported for Canadian children included pain, bruising, bleeding, and a worsening of symptoms; Americans experienced sedation (30.98%), needle pain (25.44%), and neuropathy/nervous system-related issues (15.42%); and the Swiss experienced bleeding or hematoma (6.1%), pain (1.7%), and vegetative symptoms (0.7%) [13, 14, 18]. However, a Chinese review article found that the adverse effects in China included symptoms that were more serious, such as pneumothorax, fainting, subarachnoid hemorrhage, and infection [15], thus showing differences in the severity of adverse effects between countries.

Following acupuncture, the next most common cause of adverse effects was herbal medicine, i.e., Chinese herbs. The main adverse effects were diseases of the digestive system and kidney. The rate of adverse effects based on the incidence of these two types of diseases (n=35) was 3.8% or less, and the estimated risk of serious adverse events in the overall population was as low as 0.04/10,000 patients in Korea. There were no differences relative to gender, but 20-year-olds who took herbal medicines more frequently showed diseases of the digestive system as adverse effects. For the two types of diseases experienced, 71.4% (n=25)
occurred in individuals receiving 5 or fewer TKM treatments, 5.7% (n=2) occurred in those receiving 6 to 10 treatments, and 22.9% (n=8) occurred in those receiving more than 11 treatments, indicating that the long-term, high-frequency use of herbal medicines led to more adverse effects. This is contrary to the case of acupuncture where more frequent use resulted in fewer adverse effects. This finding indicates that the adverse effects of herbal medicines are more serious. Adverse effects from acupuncture are minor and simple, whereas herbal medicines can be metabolized and cause serious damage to the organs. In Korea, significant adverse effects, such as hepatitis and neuropathy, were first reported in conferences in 1999 and 2000, respectively [19, 20].

In modern society, which requires state-of-the art science in medicine, alternative medicines and therapies have gained popularity. However, tragic adverse effects, such as Chinese herbal neuropathy, have already been reported in studies or case reports [21]. In China, there have been frequent reports of adverse effects from traditional medicines in recent years, but the causes are complex. Traditional medicines are thought to damage the liver and kidney by mechanisms similar to those observed for Western medicines [22]. The representative symptoms of herbal medicine adverse effects found in this study also included stomachache, diarrhea, jaundice, liver malfunction, and edema of the face, hands, and feet. Because this study was a survey of the general public, and the follow-up of patient adverse effects was limited, we were unable to determine the root cause and effect of the adverse events.

This study was initiated performed under the circumstance with no prior knowledge of the incidence rate of adverse effects from traditional therapies. We conducted a survey of the general public regarding traditional treatments, the experience of adverse effects, and disease development to assess the types of adverse effects. This type of survey method is not as
accurate or detailed as the research on adverse effects that is based on patient case-report studies, clinical trials, or literature reviews. However, given the few reported cases of adverse effects resulting from herbal medicines, as well as the absence of reporting systems for other traditional therapy methods (reports on pharmaceutical products depend on the pharmacovigilance system, which is based on a spontaneous reporting system). This study is also meaningful in that it allowed the assessment of the current status of the adverse effects of herbal medicines in the general population of Korea.

**Conclusion**

The reporting of adverse effects caused by all drugs and treatments for human diseases is an important topic regarding which the government has set specific regulations. However, traditional medicine, which is a part of CAM, is outside of the normal pharmaceutical system, and consequently, there are no statistical reports available on the adverse effects. In the national pharmacovigilance system, we need both an adverse effect reporting system and regulations designed specifically for other traditional therapies, such as acupuncture, moxibustion, cupping therapy, physical therapy, and chiropractic therapy. Furthermore, surveys of members of the general population who undergo regular annual treatments are required to assess the overall changes in the trends in the occurrence of adverse effects and traditional medicine. By comparing the results of these annual surveys with the adverse effects reported for herbal medicines in the national pharmacovigilance system, we will be able to establish the status and statistics of the actual incidence of the occurrence of adverse effects in Korea.
Acknowledgments

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**Competing interest:** The authors declare that they have no competing interest

**Author Contributions**

HS designed the study, performed survey, extracted data, carried out analyses and interpretations of the data, and drafted this report. MSL reviewed and critiqued this study and report and assisted with interpretation of the data. All authors read and approved the final manuscript.
References


Table 1: Usage of traditional Korean Medicine (n=915)

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All data are in n(%).
Table 2. Experience of adverse effects from traditional Korean medicinal therapies and the number of disease incidents

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