



## Original Article

# Traditional medicine for the treatment of common cold in Korean adults: A nationwide population-based study

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## ARTICLE INFO

## Article history:

Received 26 May 2020

Received in revised form 18 June 2020

Accepted 18 June 2020

Available online 24 June 2020

## Keywords:

Traditional medicine

Common cold

Prescription pattern

## ABSTRACT

**Background:** Traditional medicines (TMs) have been used to treat common cold in Asia, but no studies have been conducted to examine the trend of use for several years. The objective of this study was to analyze the prescription patterns of TMs for common cold using national claims data accrued over 7 years in Korea. This will contribute to the scientific evidence enhancing the understanding of TM use for the treatment of common cold.

**Methods:** This study analyzed national claims data from the Health Insurance Review and Assessment Service database. We extracted data for diagnosis of common cold (Korean Standard Classification of Diseases: J00, Acute nasopharyngitis) and prescriptions of TMs for adults who visited all types of oriental medical institutions during 2010–2016. We estimated the prescription patterns of TMs by sex, age group, and year.

**Results:** We extracted 3,014,428 prescriptions. The total number of prescriptions increased by 125.1% in 2016 compared to that in 2010. For all ages and periods, the number of prescriptions in women was higher than that in men. The age range with the most prescriptions was 70–79 years. The seven most prescribed TMs for common cold were Socheongnyongtang, Samsu-eum, Yeongyopaedoksan, Insampaedoksan, Gumigohwaltang, Galgeuntang, and Hyeonggae-yeongyotang.

**Conclusion:** This was the first study to analyze the prescription patterns of TMs for common cold using National Health Insurance data in Korea. This study provides scientific evidences on the disease burden and the utilization pattern of TMs for common cold to support decision making on initiatives such as allocation and management of health resources.

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## 1. Background

Traditional medicine (TM) is leveraged with Western medicine in a healthcare delivery system in South Korea.<sup>1</sup> TM, which has developed over several years in Korea, considers the interaction between various factors such as the body, mind, and environment in the treatment of diseases.<sup>2</sup> TM is based on comprehensive values such as personalized treatment through communication with patients, preventive medicine emphasizing immunity, and safe treatment using TM and non-surgical modalities.<sup>3</sup> Despite these

values, positive and negative perceptions of TM coexist, according to a recent survey. The reasons for the positive perception include usefulness proven by its utilization for hundreds of years, safety because of a minimal side effects, effectiveness, and comfort.<sup>4</sup> However, TMs are covered narrowly by the National Health Insurance (NHI) in Korea in comparison to other countries in Asia.<sup>5</sup> As society ages, the demand for healthcare policies on TM has increased.<sup>6</sup> Decision-makers should develop appropriate policies for the judicious distribution of limited resources within healthcare, which increases the need for scientific evidence in support of TM. Epidemiologic research provides the most fundamental scientific basis for evidence-based and essential medicine. Recently, many reports and articles have been published on the epidemiology and utilization patterns of TM using various resources in Korea and worldwide.<sup>7–11</sup> Additionally, TMs have been used extensively for treating respiratory diseases such as common cold or asthma.<sup>8,12–14</sup> Common cold

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is the most frequently occurring disease, and it reduces productivity in adults, which results in a significant national burden.<sup>15–23</sup> In addition, antimicrobial resistance to drugs commonly used to treat common cold also has worsened the burden of the disease.<sup>24–27</sup>

TMs represent viable alternatives for treating common cold as the overuse of antibiotics in adult patients has resulted in drug resistance and increased societal burden. TMs have been traditionally prescribed for common cold in Asian countries.<sup>28</sup> According to previous studies conducted in Korea and Japan, clinicians have been prescribing TMs for the treatment of diseases and the promotion of health because they are considered safe with few side effects.<sup>29–32</sup> Scientific evidence on key indicators, such as the economic burden and utilization patterns, is required to emphasize the advantages of TMs in treating common cold. This will help in garnering relevant political support including the expansion of NHI coverage and investment in TMs. However, no national study has been conducted to analyze the utilization patterns of TMs as treatments for common cold, except for one in Taiwan that used sample claims data accrued over a year.<sup>9</sup> The purpose of this study was to assess the utilization patterns of TMs for the treatment of common cold in Korea using national claims data; this would provide scientific evidence to support healthcare decision-making.

## 2. Methods

### 2.1. Data source and study process

This study analyzed national claims data from the Health Insurance Review and Assessment Service (HIRA) database, which covers the entire population of South Korea.<sup>33,34</sup> The claims data of the HIRA include unidentifiable information on patients' diagnoses, treatments, procedures, surgical histories, and prescription drugs. For laboratory data, we were able to identify whether patients received specific laboratory tests. However, the test results were not provided in the claims data.<sup>35</sup> The process involved in acquiring claims data from HIRA was as follows: request for data, review and approval by the HIRA committee, acquisition of permission for remote access of the analysis server, analysis of the claims data, and the transfer of results from the virtual computer to the local computer. As part of the data request process, the data provision agreement, personal information provision agreement, security and compliance agreement, and the summary of the research plan with the document of exemption or approval by IRB were prepared and submitted to the HIRA committee. The review and approval by the HIRA committee took several months. After approval by HIRA, the permission for remote access of the analysis server was granted. Claims data were analyzed on a virtual computer in the analysis server and the results were transferred to a personal computer after obtaining permission. Raw data used for analysis cannot be exported.<sup>36</sup> From the HIRA database, we extracted all claims data containing the diagnosis of common cold (Korean Standard Classification of Diseases [KCD], 5th and 6th revision [KCD-5 and KCD-6]: J00, Acute nasopharyngitis [Common cold]) and the prescriptions of TMs for common cold among adults (age  $\geq 20$  years) visiting the oriental medical center from January 2010 to December 2016. To determine the diagnosis code for analysis, we referred to the "Korean Medicine Clinical Practice Guideline for Common Cold" recently published in Korea.<sup>37</sup> This guideline assigned a patient with common cold to the diagnosis code J00 of KCD-7, which is the same as that of KCD-5 and KCD-6. In addition, we used 54 types of herbal formula as TMs for common cold in our study. In Korea, NHI has covered 126 types of TMs including 68 single herb preparations (as extract powder) and 56 herbal formulas (as mix extract powder) since 1990.<sup>8</sup> Among these, we selected TMs to be used for analysis, based on the opinion of a clinical expert practicing in a University

**Table 1**

Number of prescriptions of traditional medicines for common cold stratified by sex and age group.

Age group	Number of prescriptions for common cold		
	Total (N, %)	Male (N, %)	Female (N, %)
Total	4,959,287	1,346,319	3,612,968
20–29	342,422 (6.90%)	99,406 (7.38%)	243,016 (6.73%)
30–39	666,621 (13.44%)	185,214 (13.76%)	481,407 (13.32%)
40–49	822,967 (16.59%)	235,499 (17.49%)	587,468 (16.26%)
50–59	863,983 (17.42%)	224,023 (16.64%)	639,960 (17.71%)
60–69	965,732 (19.47%)	257,659 (19.14%)	708,073 (19.60%)
70–79	1,033,259 (20.83%)	277,993 (20.65%)	755,266 (20.90%)
$\geq 80$	264,303 (5.33%)	66,252 (4.92%)	197,778 (5.47%)

hospital (Appendix 1).<sup>38</sup> We considered all types of oriental medical institutions including oriental hospitals, oriental clinics, and Korean medicine department in medical institutions. This study was certified as exempt by the Institutional Review Board of the Pusan National University Korean Medicine Hospital (E2016011).

### 2.2. Outcome measures

We first estimated the number and proportion of prescriptions of TMs by sex and age group. Next, we examined the annual number of TM prescriptions from 2010 to 2016. Finally, we identified the 7 most prescribed TMs for common cold and analyzed the number of prescriptions stratified by year. We performed a descriptive analysis and presented continuous variables as mean  $\pm$  SD and categorical variables as frequency (%) using SAS version 9.4 (SAS Institute, Inc., Cary, NC, USA). We used Microsoft Excel to create graphs and tables based on the descriptive analysis after obtaining the relevant information from the SAS output.

## 3. Results

### 3.1. Prescriptions of TMs for common cold by sex and age group

We extracted 3,014,428 prescriptions from the claims data accrued from 2010 to 2016. In all age groups, the number of prescriptions for common cold in women was higher than that in men. The age range with the highest number of TM prescriptions in both men and women was 70–79 years (Table 1).

### 3.2. Prescriptions of TMs for common cold by year

Fig. 1 shows the annual number of TM prescriptions for common cold from 2010 to 2016. The number of prescriptions in 2016 increased by 125.1% from 2010 (male, 109.9%; female, 131.2%). The rate of change in the number of prescriptions during the period between a given year and its preceding year was highest in 2011 (43.9%).

An analysis of the annual number of prescriptions stratified by age group revealed that the rate of increase was higher in the older age group. During the 7 years, the number of prescriptions increased by 2.9%, 3.5%, 38.5%, and 85.6% in patients who were 20–29, 30–39, 40–49, and 50–59 years old, respectively. The rate increased extremely in patients  $\geq 60$  years of age. From 2010–2016, the number of prescriptions increased by 282.9%, 607.0%, and 676.1% for patients who were 60–69, 70–79, and  $\geq 80$  years of age (Fig. 2).

### 3.3. The most prescribed TMs for common cold

The seven most prescribed medicines were Socheongnyongtang, Samsu-eum, Yeongyopaedoksan, Insampaedoksan, Gumigo-hwaltang, Galgeuntang, and Hyeonggae-yeongyotang. These medi-

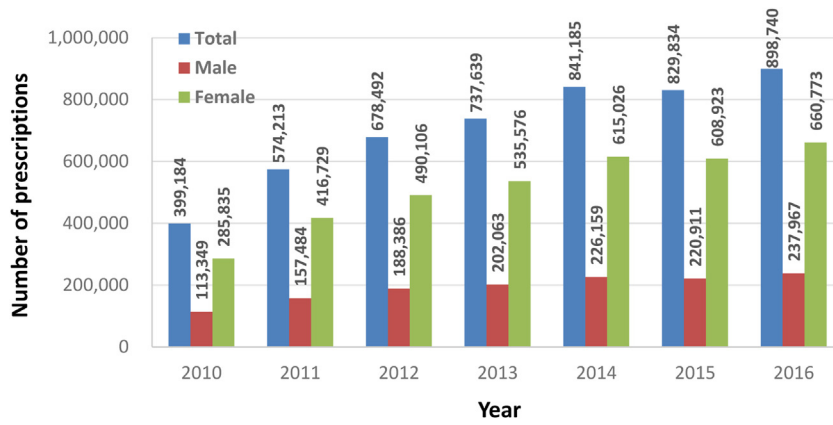


Fig. 1. Annual number of prescriptions from 2010 to 2016.

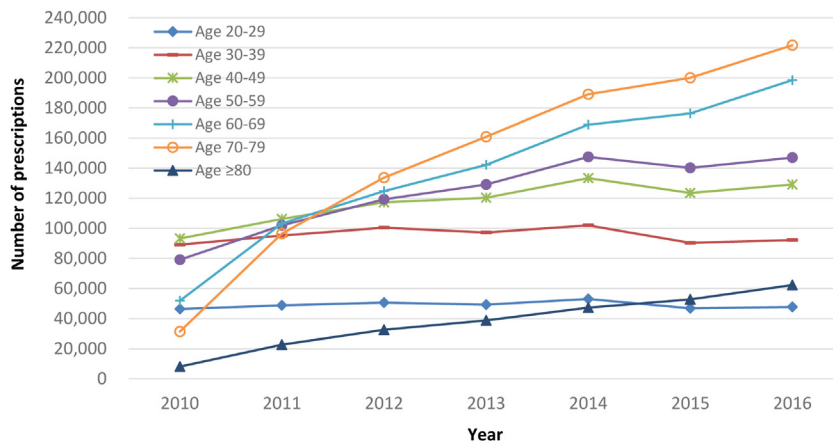


Fig. 2. Prescription trends stratified by age group and year.

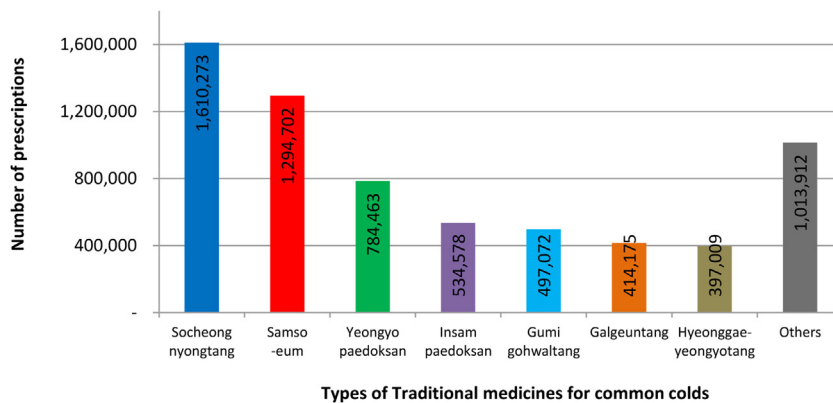


Fig. 3. Number of traditional medicine prescriptions stratified by the type of traditional medicine between 2010 and 2016.

cations accounted for 84.51% of the total TM prescriptions between 2010 and 2016 (Fig. 3). Except for Insampaedoksan, the number of prescriptions for all the top seven TMs increased during the 7 years. In all periods, Socheongnyongtang and Samso-eum were always the most and second-most prescribed TMs, respectively (Fig. 4).

#### 4. Discussion

This is the first retrospective cross-sectional study that analyzed the TM prescription patterns for common cold using NHI data in Korea. South Korea launched the NHI with coverage for 26 types of TMs through a pilot project in 1984 and expanded this to 56

types in 1990.<sup>8</sup> We found that several TMs were prescribed for the treatment of common cold, and the number has been increasing every year. We evaluated the prescription patterns of TMs in the treatment of common cold by various factors such as age, sex, year, and the type of TM.

According to the results stratified by sex, women were prescribed more TMs for common cold than men between 2010 and 2016. Similar results were reported by previous studies in Taiwan, Japan, and Korea, which also analyzed the usage patterns of TM.<sup>4,7,32,39</sup> According to previous studies that analyzed attitudes and trusts for TMs, women generally trusted TMs and

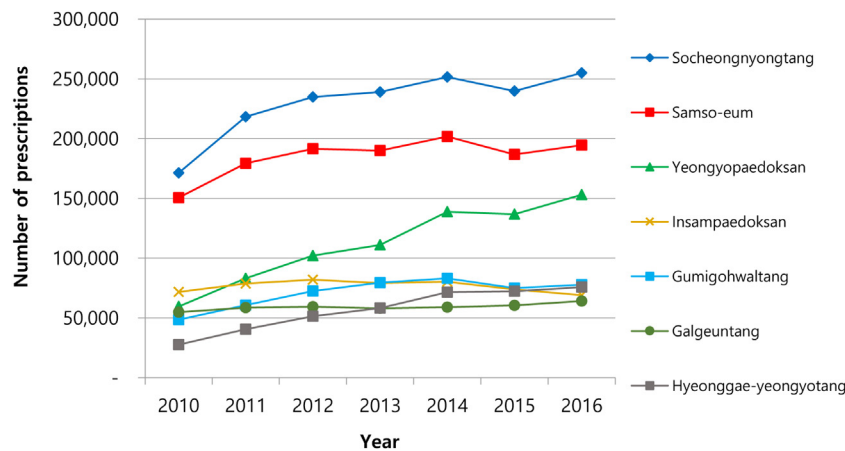


Fig. 4. Number of traditional medicine prescriptions stratified by year and the type of traditional medicine.

visited oriental medical centers more often than men.<sup>4,30,40</sup> Conboy et al. reported that women were more interested in health and may actively explore and practice various health plans and management.<sup>41,42</sup> However, more comprehensive research is needed to determine why women's utilization rate is higher than that of men in TMs.

According to the results by year, the number of prescriptions continued to increase except in 2015. In a previous study that analyzed the use of TMs regardless of indications, the total number of prescriptions for three TMs including Socheongnyongtang, Samsso-eum, and Insampaedoksan also slightly decreased in 2015.<sup>43</sup> As far as we know, there were no policy factors that could affect the decline of TMs in 2015. Additional research is required to determine why the number of prescriptions did not increase in 2015. In our study, the total number of prescriptions of TMs for common cold increased by 125.14% in 2016 from 2010. Previous studies also showed that the utilization rate of TM increased with time.<sup>8,11,40</sup> Kwon et al., in comparing the use of TM in 2011 and 2014, reported that the adoption of treatments such as acupuncture, moxibustion, cupping, and chuna decreased, while herbal medicine use increased.<sup>40</sup> Due to the limitation of the cross-sectional study design, we could not certain the factors that influenced the change in TM prescription for common cold. However, according to previous studies, age is closely related to the use of TM.<sup>39,44</sup> The Korean society is rapidly aging, and this may have influenced the increase in the annual use of TM. Further studies are required to ascertain the overall factors influencing the increase in TM use.

Our study showed that the annual number of TM prescriptions for common cold increased with age, especially in patients aged 60 years or older. This trend was more evident between 2010 and 2011. This may be attributed to the revision of the fixed copayment program for outpatients aged 65 years or older in Korea. In 2011, the standard price of the fixed copayment program for older adults increased from 15,000 won to 21,000 won. A previous study reported that this revision significantly influenced the increase in the number of TM prescriptions, especially for patients over 65 years of age.<sup>45</sup> As another possible cause, the differences in the perception of TM by age may have influenced the use of TM for common cold. In Korea, previous studies reported that trust was lower in younger age groups.<sup>4,30,40</sup> Kwon et al. reported that the "lack of scientific evidence" was the main reason for distrust in TMs in younger age groups, which was consistent with findings from other studies.<sup>40</sup> In our study, the number of prescriptions was highest in patients who were 70–79 years of age, but in Taiwan, patients who were 30–59 years of age used TMs for common cold more than any other group.<sup>9</sup> Our study analyzed the claims data based on a prescription unit, while the Taiwan study performed the analy-

sis based on a patient unit, and this may have contributed to the difference. In addition, different policies and clinical applications for TMs in the two countries may have affected the prescription patterns.<sup>39,46</sup> For a comprehensive understanding of the factors influencing the TM prescription patterns, additional studies considering disease indication, efficacy, national policies, and perception of TM are required.

In this study, we identified the most commonly prescribed TMs for treating common cold. Socheongnyongtang and Samsso-eum were the two most prescribed drugs from 2010 to 2016. Socheongnyongtang consists of eight species of medicinal plants, and it is used to treat cold with persistent external symptoms, including fever, cough, and dyspnea. Samsso-eum is a decoction of Sappan Lignum and is used to treat symptoms of common cold, including chills, fever, spontaneous sweating, headache, nasal congestion, and cough with sputum.<sup>47</sup> Following these two drugs, the most frequently prescribed drugs for common cold were Yeongyopaedoksan, Insampaedoksan, Gumigohwaltang, Galgeuntang, and Hyeonggae-yeongyotang, in descending order. Yeongyopaedoksan has been used to treat respiratory and inflammatory diseases. Insampaedoksan, the original version of Yeongyopaedoksan, is usually used to treat fevers with headache and joint, and generalized pain.<sup>48</sup> Gumigohwaltang is used to treat headaches, joint pain, aversion to cold with fever, absence of sweating, and floating and tense pulse.<sup>49</sup> Galgeuntang and Hyeonggae-yeongyotang are also used to treat sequelae of common cold, including inflammation.<sup>50,51</sup> TMs commonly used for treating common cold in Taiwan, according to a study, were Yin-Qiao-San, Xin-Yi-Qing-Fei-Tang, Ma-Xing-Gan-Shi-Tang, Chuan-Xiong-Cha-Tiao-San, Ge-Gen-Tang, Xin-Yi-San, and Jing-Fang-Bai-Dun-San.<sup>9</sup> The different findings from our study may be attributed to the influence of the environment, culture, and race on the development and use of TM.<sup>5</sup> Another factor may be the differences between the healthcare systems for TMs in different countries. The Taiwanese NHI covers 337 types of Chinese herbal formulas and over 500 types of Chinese single herbal preparations, while the Korean NHI covers only 56 herbal formulas and 68 single herb preparations.<sup>52</sup> This difference in coverage may have affected the burden of treatment and limited the range of TMs prescribed.

Some limitations should be considered when interpreting our results. First, our study evaluated the usage patterns of TMs at a prescription level, which made it difficult to analyze the characteristics of patients using TMs for common cold. To better understand the factors affecting the patterns of TM use by patients with common cold, additional research using data prioritizing patient characteristics is necessary. Next, we were not able to evaluate over-the-counter or uninsured TM use, because we used claims

data from the HIRA. Currently, only 56 herbal formulas (as mixed-extract powders) are covered by the NHI in Korea. However, the most commonly used forms of TM in clinical practice are packages of crude herbal decoction, which can be used flexibly to treat various conditions and diseases as over-the-counter or uninsured medication.<sup>8</sup> To identify the treatment patterns involving these types of TMs, additional research, such as a survey or prospective study, is required.

Despite these limitations, our study is the first to evaluate the annual prescription patterns of TMs used to treat common cold over a long period (7 years) using national claims data. A previous study conducted in Taiwan also analyzed TMs for common cold using health insurance data, but that study only used sample data accrued over a year (2011), making it difficult to identify long-term trends.<sup>9</sup> Our study results are not only representative because the data was extracted from the national claims data, but also we analyzed the TM prescriptions over a long period stratified by age, sex, and the type of TM. In Korea, microbial resistance caused to antibiotics commonly used in treating common cold is frequent. Therefore, the advantage of TMs, which alleviate concerns about antibiotic resistance, cannot be over emphasized.<sup>53</sup> However, investment in TMs in inadequate due to the high price and the lack of scientific evidence and policy support.<sup>54</sup> We did not evaluate the effectiveness of TMs in this study, and to evaluate the role of TMs in reducing the risk of antibiotic resistance, future studies are required. However, we believe that our research, which had representative results on the use of TMs for common cold, can be used as a scientific basis for healthcare decision making for initiatives, such as the allocation and management of healthcare resources, that take the economic burden and the utilization patterns of TMs for common cold into consideration.

In this large-scale, nationwide, population-based study, we found that the adoption of TMs in treating common cold is increasing. The results of this study may be used as real-world evidence of utilization patterns of TMs for the treatment of common cold. Further studies evaluating the efficacy and effectiveness of TMs are warranted.

### Author contributions

Conceptualization: HK, JYC, MH, and HSS. Methodology: HK, JYC, MH, and HSS. Validation: HK, JYC, MH, and HSS. Formal Analysis: HK. Investigation: HK, JYC, and HSS. Resources: HK, JYC, and HSS. Data Curation: HK and HSS. Writing – Original Draft: HK, JYC, MH, and HSS. Writing – Review & Editing: HK, JYC, and HSS. Visualization: HK. Supervision: JYC and HSS. Project administration: HK, JYC, and HSS. Funding Acquisition: JYC.

### Conflict of interest

The authors declare no conflict of interest.

### Funding

This study was supported by the Traditional Korean Medicine R&D Program funded by the Ministry of Health & Welfare through the Korea Health Industry Development Institute (KHIDI) (HB16C0006).

### Ethical statement

This research has been approved by the Institutional Review Board of the Pusan National University Korean Medicine Hospital (IRB number: E2016011).

### Data availability

We used the data provided by the HIRA (M20170828763); however, we declare that the results do not reflect the positions of either the HIRA or the Ministry of Health and Welfare in South Korea. The data that support the findings of this study are available from Health Insurance Review and Assessment but restrictions apply to the availability of these data, which were used under license for the current study, and they are not publicly available. Data are however available from the authors upon reasonable request and with the permission of Health Insurance Review and Assessment.

### Supplementary material

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.imr.2020.100458>.

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