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Trends in Triptan Usage in Korea: A Population-Based Cohort Study

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ABSTRACT

Background: Migraine presents a significant global health problem that emphasizes the need for efficient acute treatment options. Triptans, introduced in the early 1990s, have substantially advanced migraine management owing to their effectiveness compared to that of traditional medications. However, data on triptan use in migraine management from Asian countries, where migraines tend to have milder symptoms than those in European and North American countries, are limited. This study aimed to identify the trends in triptan usage in Korea.

Methods: This retrospective cohort study used data from the Korean National Health Insurance Service-National Sample Cohort spanning from 2002 to 2019. Patients with migraine were identified using the International Classification of Diseases 10th revision codes, and triptan prescriptions were evaluated annually in terms of quantity, pills per patient, and associated costs. The distribution of triptan prescriptions across different medical specialties was also examined. Factors contributing to the odds of triptan use were analyzed using multivariable logistic regression.

Results: From 2002 to 2019, the total number of triptan tablets, prescriptions, and patients using triptans increased by 24.0, 17.1, and 13.6 times, respectively, with sumatriptan being the most frequently prescribed type of triptan. Additionally, the number of prescriptions and related costs have consistently increased despite stable pricing because of government regulation. By 2019, only approximately one-tenth of all patients with migraines had been prescribed triptans, although there was a notable increase in prescriptions over the study period. These prescription patterns varied according to the physician's specialty. After adjusting for patient-specific factors including age and sex, the odds of prescribing triptans were higher for neurologists than for internal medicine physicians (odds ratio 2.875, $P < 0.001$), while they were lower for general practitioners (odds ratio 0.220, $P < 0.001$).

Conclusion: The findings revealed an increasing trend in triptan use among individuals with migraines in Korea, aligning with global usage patterns. Despite these increases, the overall prescription rate of triptans remains low, indicating potential underutilization and highlighting the need for improved migraine management strategies across all medical fields. Further efforts are necessary to optimize the use of triptans in treating migraines effectively.

Keywords: Migraine Disorders; Triptans; Drug Therapy; Treatment Outcome; Serotonin 5-HT₁ Receptor Agonists

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Disclosure

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Author Contributions

Conceptualization: Chu MK. Data curation: Ha WS. Formal analysis: Ha WS, Jeong JW. Investigation: Ha WS. Methodology: Song SW, Chu MK. Validation: Song SW. Visualization: Ha WS. Writing the original draft: Ha WS. Writing - review & editing: Song SW, Yum JY, Chu MK.

INTRODUCTION

Migraine is a common neurological disorder; however, its recurrent headaches and comorbidities pose a significant burden on individuals and society. It is ranked as the second-most common cause of disability globally in terms of years lived with disability, and the most common cause among young women.¹ More than a billion people worldwide suffer from migraine; therefore, acute and effective treatments for migraine attacks are crucial.¹ However, migraine remains underdiagnosed and undertreated, even by physicians and neurologists.^{2,3}

The discovery of the involvement of 5-hydroxytryptamine (5-HT) in migraine pathogenesis led to the development of triptans, which are 5-HT_{1b/d} receptor agonists.⁴ Since their introduction in the early 1990s, triptans have been recognized as being highly effective for the treatment of acute migraine.⁵ Consequently, triptans have become the first line of acute treatment for migraine when simple analgesics and non-steroidal anti-inflammatory drugs are insufficient.⁶ Several different triptans are available, each with its own efficacy and tolerability profile.⁷

Previous European and American studies have reported that despite gradual increase in triptan use, only a small proportion of individuals with migraines use triptans.^{8,9} This may be because the use of drugs, including triptans, can be influenced by socioeconomic status and health insurance coverage in each country.^{8,10} Moreover, accurate diagnosis by physicians and severity of migraine symptoms also contribute to triptan use in the treatment of migraine. However, few studies have reported on the use of triptans in Asia, including Korea. Considering that migraine tends to have milder symptoms in Asians than in Europeans and North Americans,¹¹ triptan use in Asia might show distinct trends compared to those reported previously. This study aimed to identify trends in triptan use in Korea using population-based cohort data.

METHODS

Study design and data source

We conducted a retrospective population-based cohort study utilizing data from the Korean National Health Insurance Service-National Sample Cohort (NHIS-NSC) database. A comprehensive description of the design and methodology of the NHIS-NSC database has already been provided.¹² In brief, the National Health Insurance Service was launched in 2000 to cover all citizens in the Republic of Korea, consolidating various previous public health insurance schemes and providing benefits for the prevention, diagnosis, and treatment of illness and injury, rehabilitation, maternity, mortality, and health promotion. The NHIS has since become mandatory for all Korean citizens, providing medical coverage to 97% of the Korean population and Medical Benefit to the remaining 3% who are at the lowest income level. The NHIS maintains and stores national records of healthcare utilization and prescription records. In 2002, the large size of the NHIS data limited its use; therefore, a cohort of 1,000,000 qualified individuals (2.2% of the total Korean population)—proportional to the population—was created for effective use. Each participant in the NHIS-NSC database is assigned a unique anonymous identifier, and the database includes extensive demographic and medical records from 2002 to 2019, including age, sex, residential area, insurance type, income bracket, and International Classification of Diseases, Tenth Revision

(ICD-10)-classified diagnoses and prescriptions. This configuration of the NHIC-NSC makes it possible to investigate the longitudinal trends of triptan use in the Korean population. Assuming that the proportion of the population using triptans is approximately 1%—based on previous studies—we can estimate triptan usage for the entire Korean population (approximately 50 million) with 99.9% confidence and a margin of error of < 0.1% by analyzing data from 1 million people in the NHIS-NSC.^{8,9}

Assessment of triptan use

In the Republic of Korea, triptans are only available via prescription by medical doctors; therefore, all triptan usage is captured by the NHIS. The NHIS-NSC cohort includes information on the prescriptions and purchases of all triptans at the individual level, including the unique anonymous identifiers, ingredient name codes, dose units, and the number of dose units in the packages. The price of each triptan is determined by state notification and the person to whom it has been prescribed pays the same price per pill.

In this study, we reviewed and summed all triptan prescriptions within the NHIS-NSC cohort from January 1st to December 31st of each year from 2002 to 2019. This allowed us to calculate the total annual number of triptan pills, number of prescriptions, and prescription costs. The costs were calculated in Korean Won without considering the inflation rate. This process was repeated separately for each type of triptan. Additionally, we included information on all patients who received triptan prescriptions annually, including their sex, age, and residential area.

Identification of migraine diagnosis

In Korea, triptans have been approved for the treatment of migraine since 1996 and are prescribed only when this condition is diagnosed. To determine the percentage of patients with migraine using triptans, we identified patients with migraine using ICD-10 codes. Those diagnosed with ICD-10 code G43 at least once a year were considered to have migraines; however, migraine diagnoses in the previous or subsequent years were not considered as migraine diagnoses in the current year. For each year, we calculated the number of people diagnosed with migraines and those among them who were prescribed triptans at least once; subsequently, we calculated the percentage of patients who received triptan prescriptions.

Assessment of triptan use according to physician specialty

Triptan use by physician specialty was calculated as the total number of triptans used per year by physician specialty. We then calculated the proportion of triptan use by physician specialty as the proportion of patients diagnosed with migraine who were prescribed triptans during the year.

Statistical analysis

In this study, continuous variables are presented as means and standard deviations (SD), while categorical variables are reported as frequencies and percentages. Demographic data were compared between the groups using Student's t-test for continuous variables and the chi-square test for categorical variables, as applicable. Multivariable logistic regression models were used to estimate the odds ratios (ORs) and 95% confidence intervals (CIs) to assess the factors contributing to the likelihood of triptan use in patients with migraine. All outpatient visits with a migraine diagnosis in 2019 were analyzed for whether a triptan was prescribed, with physician specialty as an independent variable, along with demographic characteristics. Some variables were dichotomized for ease of analysis, such as age (< 20,

20–39, 40–59, and ≥ 60 years) or residential area (urban versus rural; urban was defined as metropolitan cities in the administrative divisions of Korea: Seoul, Busan, Daegu, Incheon, Gwangju, Daejeon, Ulsan). Statistical significance was defined as a 2-tailed P value < 0.05 . No imputation was performed for missing data. All data extraction and statistical analyses were performed using SAS software (version 9.2; SAS Institute, Cary, NC, USA), while graphs showing yearly trends were created using GraphPad Prism version 9.0 software (GraphPad Software, 102 Inc., San Diego, CA, USA).

Ethics statement

This study was reviewed and approved by the NHIS Inquiry Commission and the Institutional Review Board of Severance Hospital (No. 4-2023-1309), and was conducted in accordance with the principles of the Declaration of Helsinki and its subsequent amendments. The requirement for informed consent was waived because of the secondary analytical study design and the use of de-identified participant data.

RESULTS

Triptan availability in Korea

Sumatriptan was the first triptan drug marketed in Korea in 1996, and five triptans are currently available (Table 1). All the triptans are in tablet formulations, with no injections or nasal sprays available. Moreover, mixed formulations of triptans and other drugs are not available in Korea. The price of triptans ranges from 1,802 to 4,139 Korean Won (1.35–3.11 US dollar, as of February 15, 2024), per pill.

Sample identification and patient demographics

Since the study population included in this research changed every year, we summarized the demographic characteristics of patients diagnosed with migraine in 2019 as a representative year, comparing those with and without triptan prescriptions (Table 2). By 2019, 3,324 patients had been prescribed triptans for migraine, and 27,580 had not. Most patients with triptan prescriptions were female (77.7%), with a mean age of 43.9 years (SD = 15.3). Patients without triptan prescriptions were also predominantly female (67.5%), with a slightly higher mean age of 50.9 years (SD = 19.4). Female predominance and younger age were more pronounced in the triptan-prescribed group (both, $P < 0.001$). Both groups had a higher proportion of patients from rural areas than that from urban areas, although this trend was

Table 1. Triptan medications currently marketed in Korea

Generic name	Brand name	Approval date in Korea	Dosage form	Price per tablet (Korean Won)
Sumatriptan	Imigran [®]	1996.09.30	50 mg tablet	2,700–3,621 (50 mg)
	Sumatran [®]		25 mg tablet	1,802 (25 mg)
	Sumatriptan [®]		(Sumatran only)	
	Sugran [®]			
	Migran [®]			
Naratriptan	Naramig [®]	1999.01.12	2.5 mg tablet for Naramig	3,685–4,095
	Nagran ^{®a}		2.5 mg oral dispersible for Nagran	
Zolmitriptan	Zomig [®]	1999.12.22	2.5 mg tablet	4,139
Almotriptan	Almogran [®]	2008.02.26	17.5 mg tablet	3,658
Frovatriptan	Migard [®]	2009.05.29	2.5 mg tablet	3,426

^aLaunched after the timeframe of this study.

Table 2. Characteristics of patients diagnosed with migraine in 2019: comparing those with and without triptan prescriptions

Variables	Patients with prescription of triptan (n = 3,324)	Patients without prescription of triptan (n = 27,580)	P value
Sex			< 0.001
Male	741 (22.3)	8,974 (32.5)	
Female	2,583 (77.7)	18,606 (67.5)	
Age	43.9 ± 15.3	50.9 ± 19.4	< 0.001
Age distribution, yr			< 0.001
< 20	168 (5.1)	1,964 (7.1)	
20–39	1,135 (34.1)	6,003 (21.8)	
40–59	1,517 (45.6)	9,652 (35.0)	
≥ 60	504 (15.2)	9,961 (36.1)	
Residential area			< 0.001
Rural	1,744 (52.5)	16,674 (60.5)	
Urban	1,580 (47.5)	10,906 (39.5)	
Medical aid beneficiaries	43 (1.3)	473 (1.7)	0.073

Values are presented as number (%) or mean ± standard deviation.

less significant in the triptan-prescribed group ($P < 0.001$). A small percentage of medical aid beneficiaries was observed in both groups. In 2019, 57 people (1.7% of total individuals who were prescribed triptan) were prescribed triptans without a current diagnosis of migraine, including 29 who had previously been diagnosed with migraine between 2002 and 2018. In total, 1,055 triptan pills were prescribed to them in 2019, accounting for 1.16% of all the triptan pills prescribed.

To observe changes in the triptan-prescribed population over time, we presented the age-specific numbers of triptan prescriptions for 2002, 2010, and 2019 according to the total age distribution of the Korean population (Fig. 1). In 2002, 30–35-year-olds were the most common age group in the cohort, with the highest triptan use in 40–45-year-olds (Fig. 1A). In 2010, 35–40-year-olds were the most common age group in the cohort, and triptan use was the highest in that age group (Fig. 1B). Similarly, in 2019, 45–50-year-olds were the largest age group in the cohort, with the highest triptan use in this age group (Fig. 1C).

Annual summary of triptan prescription rate, number of triptan pills, and cost of triptans in Korea

The number of triptan tablets used, number of prescriptions for triptans, and money spent on triptan prescriptions in Korea have increased steadily. In fact, between 2002 and 2019, the total number of triptan tablets, prescriptions, and patients using triptans increased by 24.0,

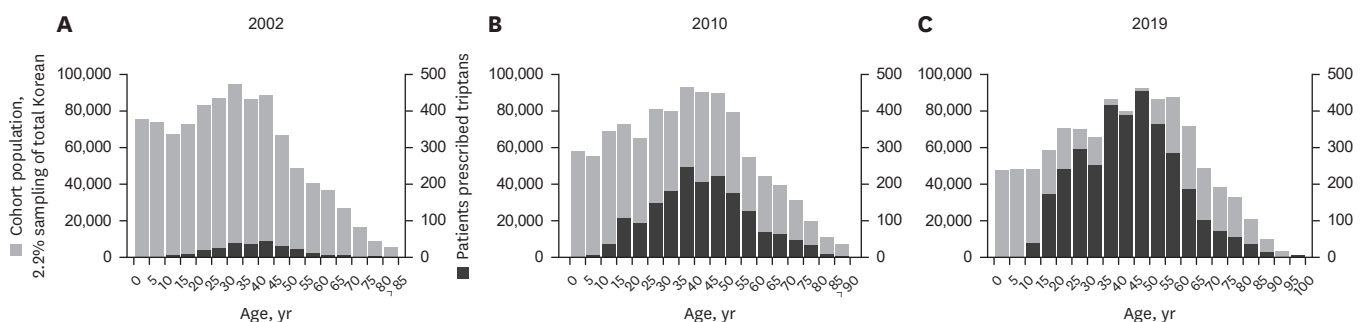


Fig. 1. Annual distribution of the cohort (gray) and triptan users (black) according to age groups. (A) 2002. (B) 2010. (C) 2019.

Table 3. Annual summary data for the use of triptans: 2002–2019

Year	No. of tablets	Prescription cases	Reimbursement for triptan prescription claims	Proportion among patients with migraine per year	Cost of triptans per prescription (Korean Won)
2002	3,785	432	15,874,359	1.6%	36,746
2003	5,981	794	25,126,525	2.9%	31,645
2004	8,780	1,220	37,296,034	4.1%	30,571
2005	10,655	1,387	45,355,796	4.2%	32,701
2006	12,391	1,579	52,565,356	4.3%	33,290
2007	18,080	1,968	75,786,914	5.1%	38,510
2008	21,778	2,272	88,190,430	5.7%	38,816
2009	27,272	3,002	105,152,017	6.8%	35,027
2010	29,439	3,316	113,823,133	7.8%	34,325
2011	35,261	3,706	136,000,018	8.3%	36,697
2012	42,697	4,098	157,722,449	8.1%	38,488
2013	43,008	4,157	156,744,616	8.1%	37,706
2014	48,354	4,503	178,081,232	8.2%	39,547
2015	54,265	5,057	196,166,798	8.4%	38,791
2016	63,360	5,734	229,426,188	9.0%	40,012
2017	68,423	5,996	246,976,589	9.4%	41,190
2018	77,603	6,518	280,316,658	9.8%	43,007
2019	90,934	7,382	327,438,480	10.8%	44,356

17.1, and 13.6 times, respectively. The number of triptan prescriptions and pills prescribed per patients with migraine per year continued to increase (Table 3).

Annual summary of the number of triptan prescriptions, number of prescribed triptan pills, and cost of triptan per patient

The cost of triptans per prescription did not change significantly from 2002 to 2013, as the cost of triptans did not change significantly; however, it did increase from 2014 to 2019. The cost of triptans per patient per year has also been stable since 2002 and increased steadily between 2014 and 2019 (Table 4).

Table 4. Annual summary of the use of triptan per patient

Year	No. of triptan prescriptions per patient per year	No. of pills of triptan prescribed per patient per year	Cost of triptan per patient per year (Korean Won)
2002	1.9	16.2	68,130
2003	1.8	13.5	56,847
2004	1.8	12.8	54,447
2005	1.9	14.3	61,044
2006	2.0	15.5	65,954
2007	2.0	18.4	77,334
2008	2.0	18.8	76,223
2009	2.0	18.3	70,477
2010	1.9	17.3	66,719
2011	2.0	19.2	74,034
2012	2.1	22.2	81,891
2013	2.1	21.7	79,244
2014	2.1	22.8	83,921
2015	2.2	23.5	85,068
2016	2.2	24.5	88,582
2017	2.2	25.2	90,934
2018	2.2	26.3	94,990
2019	2.2	27.3	98,448

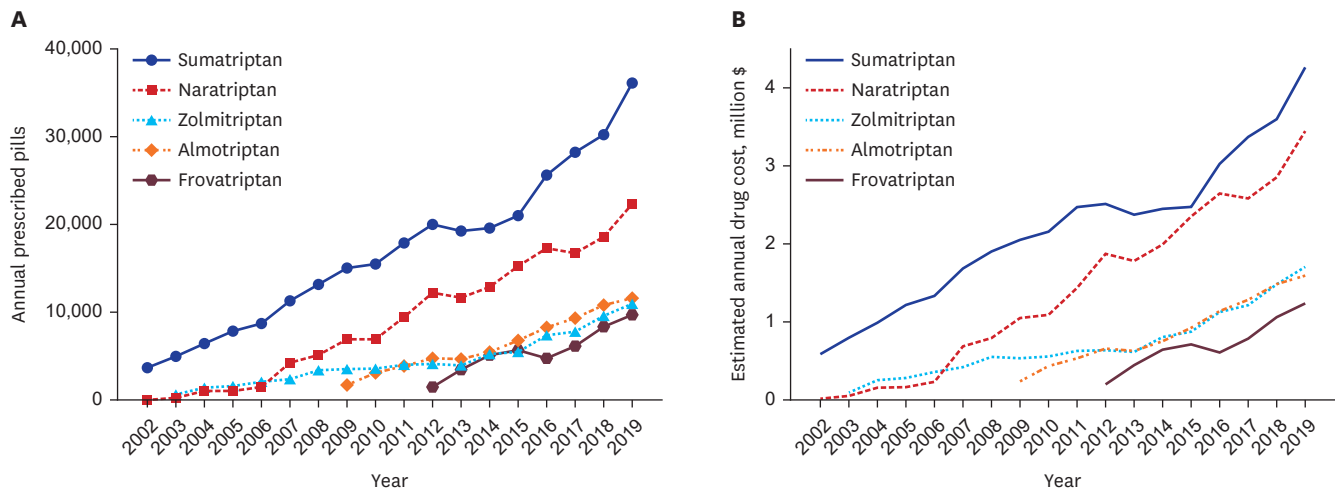


Fig. 2. Trends of annual triptan use in Korea. (A) Number of total prescribed pills for each triptan drug. (B) Reimbursement for triptan prescription for each triptan drug.

Annual trends of prescription costs and cost by triptan type

Since 2002, sumatriptan has been the most prescribed drug in terms of both the number of prescriptions (Fig. 2A) and the cost of reimbursement (Fig. 2B), with a steady upward trend through 2019. Naratriptan had similar trends to zolmitriptan between 2003 and 2006, when it was first introduced. However, from 2006 to 2019, it was the second most prescribed drug in terms of the number of pills and prescription cost behind sumatriptan until 2019. Zolmitriptan ranked third in terms of the number of pills prescribed and the cost of prescriptions after naratriptan from 2006 to 2009; however, after the introduction of almotriptan in 2009, the number of pills and cost of prescriptions remained similar until 2019.

Triptan use and prescription rate by physician specialty

The number of triptan pills prescribed by physician specialty was consistently the highest among neurologists from 2002 to 2019, followed by internists. As of 2019, this was followed by neurosurgery, family medicine, orthopedics, otolaryngology, psychiatry, anesthesiology, pediatrics, and general physicians (Fig. 3A).

Trends in the proportion of triptan prescriptions for patients with migraine according to physician specialty are shown in Fig. 3B. For most of the period from 2002 to 2019, neurologists administered the highest rate of triptan prescriptions for patients with migraines, with the prescription rate continuing to rise. Psychiatrists occasionally had higher prescription rates than neurologists from 2002 to 2019; however, for much of the period, they were second only to neurologists and similar to neurosurgeons. Family physicians, internists, and pediatricians were the next most common prescribers (Fig. 3B).

Factors contributing to the likelihood of triptan use in patients with migraine

In 2019, 30,904 patients had 97,087 outpatient visits with a migraine diagnosis. Of these visits, triptans were prescribed in 7,606 cases. In the multivariable logistic regression analysis, all covariates—sex, age, residential area, medical aid, and physician specialty—were found to be significant factors (Table 5). Among the patient-related factors, the odds of receiving a triptan prescription were higher for females, individuals aged 20–39 years, and urban residents. Regarding physician specialty, neurologists (OR, 2.875; 95% CI, 2.701–3.060) and neurosurgeons (OR, 1.424; 95% CI, 1.260–1.609) had higher odds of prescribing triptans

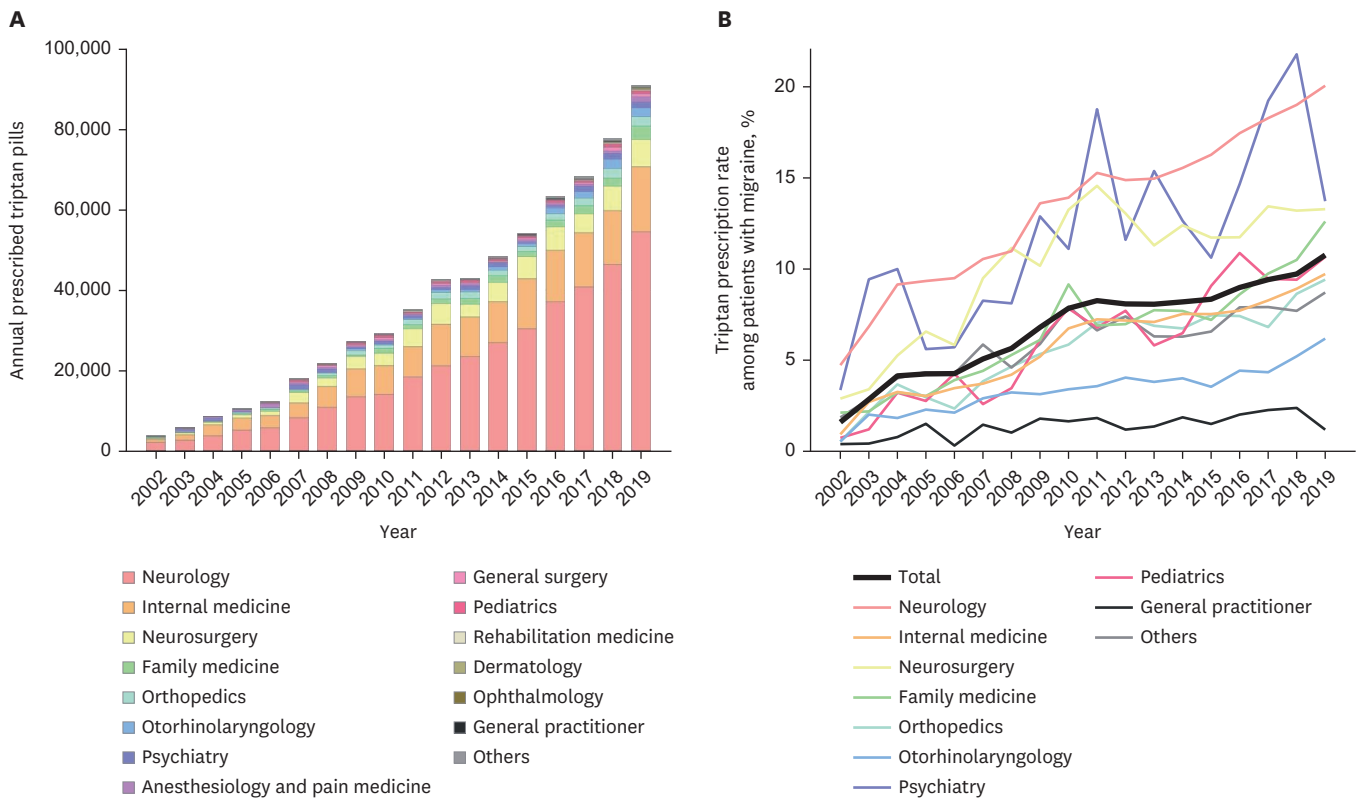


Fig. 3. Trends of annual triptan prescription by physician's specialty. (A) Number of prescribed pills. (B) Percentage of prescriptions for migraine patients.

Table 5. Multivariable logistic regression assessing odds of being prescribed triptans in patients with migraine in 2019

Variables	Odds ratio	95% confidence interval	P value
Sex			
Female	1	-	-
Male	0.623	0.587-0.661	< 0.001
Age, yr			
< 20	0.422	0.368-0.484	0.002
20-39	1	-	-
40-59	0.726	0.686-0.769	< 0.001
≥ 60	0.195	0.181-0.210	< 0.001
Residential area			
Rural	1	-	-
Urban	1.259	1.199-1.323	< 0.001
Medical aid beneficiaries	0.597	0.467-0.763	< 0.001
Physician specialty			
Internal medicine	1	-	-
Neurology	2.875	2.701-3.060	< 0.001
Neurosurgery	1.424	1.260-1.609	< 0.001
General practitioner	0.220	0.109-0.443	< 0.001
Others	0.521	0.483-0.563	< 0.001

compared to internal medicine physicians, while general practitioners (OR, 0.220; 95% CI, 0.109-0.443) and physicians of other specialties (OR, 0.521; 95% CI, 0.483-0.563) had significantly lower odds.

DISCUSSION

The key findings of this study are summarized as follows: 1) despite only one-tenth of all migraine patients being prescribed triptans in 2019, there was a consistent increase in the proportion of migraine patients receiving triptan prescriptions from 2002 to 2019; 2) the number of triptan prescriptions, quantity of triptan pills prescribed, and annual cost per person for triptan prescriptions increased steadily over the same period; and 3) the rate of triptan prescription among migraine patients varied by physician specialty, with neurologists prescribing the highest percentage of triptans to migraine patients throughout most of the period from 2002 to 2019.

In our study, the use of triptans in patients with migraine increased from 1.6% in 2002 to 10.8% in 2019. This increase over time aligns with findings from other international studies.^{8,9} For example, a previous nationwide study in Denmark observed that the rate of triptan prescriptions per 1,000 inhabitants escalated from 5.2 in 1994 to 14.5 in 2019.⁹ Similarly, a study in the United States found that triptan usage among migraine patients grew from 15% in 1998 to 35.4% in 2017.¹³ This upward trend in triptan prescriptions among migraine patients is believed to stem from increased migraine diagnoses, heightened awareness of the importance of prescribing triptans, and the broader availability of triptans through health insurance.

Previous investigations into triptan use have primarily been carried out in Europe or the United States, where prescribing patterns may differ owing to socioeconomic factors, healthcare systems, and the various characteristics of migraine. Migraine tends to have a lower prevalence and milder symptoms in Asians, including Koreans, than in Europeans and North Americans.^{11,14} Additionally, the health insurance system in Korea is distinct from that in Europe and the United States.^{4,15} To our knowledge, this study is the first to examine triptan use in Asia and report that the prescription rate of triptans is increasing in Asian countries, including Korea.

In the present study, we observed not only an increase in the number of patients prescribed triptans and the overall use of triptans, but also consistent increases in the number of triptans prescribed, the number of prescriptions issued, and the annual cost of triptans per person from 2002 to 2019. These trends mirror those found in other studies that have examined changes in triptan usage over time.^{8,9,13} Specifically, the cost of triptans in 2019 was 1.45 times higher than that in 2002. However, considering the consumer price index in Korea, which was 78.2 in 2002 and 115.2 in 2019, the cost of triptans per capita—adjusted for consumer prices—has decreased despite an increase in per capita usage.¹⁶ This outcome can be attributed to the fact that the pricing of triptans in Korea is regulated by the government and remains relatively stable despite general inflation.¹⁷

The current study also discovered that the rate at which physicians prescribe triptans for patients with migraine varies across specialties, with neurologists issuing the most prescriptions for triptans and general practitioners the least, even though the overall prescription rates for triptans are increasing. This discrepancy could stem from the different perceptions of migraine and triptans among medical specialties. Although physicians from various medical specialties—including general practitioners—manage migraine patients, neurologists have shown the greatest interest in this condition in Korea.¹⁸ In fact, neurologists constitute the majority of members of the Korean Headache Society, the leading

academic society in headache research in Korea.¹⁹ This society released its first guidelines for migraine treatment in 2008, with subsequent updates strongly advocating the use of triptans for acute migraine management.²⁰ Considering that migraine patients are managed by physicians from various specialties and not exclusively by neurologists, it is crucial for all physicians treating headaches to be well informed regarding migraine diagnosis and the primary role of triptans in treating migraine.

Migraine prophylaxis refers to treatments aimed at preventing migraine attacks and is utilized when acute treatments are insufficient or when the frequency of headaches is high, as seen in high-frequency episodic migraines (EMs) or chronic migraines (CMs).²¹ Oral medication-based prophylaxis has been used since the 1990s, pre-dating the introduction of triptans.²² Theoretically, as effective prophylaxis becomes more widespread and the incidence of migraine remains stable, the use of triptans may decrease. However, we observed a continuous increase in triptan usage over time, a trend that is consistent with findings from other studies.^{8,9} This ongoing increase in triptan use, despite the availability of prophylactic treatments, may be because of a greater increase in triptan use among patients with EM who do not require prophylaxis, compared to the decreased use of triptans among patients with high-frequency EM or CM who benefit from prophylaxis owing to reduced attack frequency.²³ Nonetheless, considering that triptan usage is higher in patients with high-frequency EM or CM who require prophylaxis than in those with low-frequency EM, effective migraine prophylaxis could lead to a reduction in triptan use once its integration into patient care is complete and the upward trend begins to plateau. With the introduction of anti-Calcitonin Gene-Related Peptide (CGRP) monoclonal antibodies and CGRP antagonists as effective migraine prophylaxis since 2018, a decrease in triptan use has been noted, making it intriguing to monitor the future trends in triptan usage following the introduction of anti-CGRP monoclonal antibodies in Korea in 2019.¹³

The present study had several limitations. First, although we examined triptan prescriptions from 2002 to 2019 using data from a Korean population-based cohort, the issuance of prescriptions does not necessarily mean that all patients obtained their medications from pharmacies. Therefore, errors may have occurred because of this discrepancy. Second, although this dataset provided valuable insights, it did not allow us to assess whether triptans were effective in individual cases; therefore, we were unable to investigate whether triptans worked appropriately. Although reports suggest that triptans are more effective than non-specific medications such as conventional analgesics, existing studies indicate that a significant proportion of triptan users find them insufficiently effective.^{24,25} This corresponds to the sustained increase in triptan use observed in our study, suggesting that triptans are effective in treating migraines. However, understanding the rates and characteristics of their effectiveness will help ensure that triptans are used more efficiently, thereby reducing the burden of migraine. The third limitation to our study was that although we analyzed the individuals' annual number of triptan prescriptions and their associated costs, we were unable to examine how individuals sustained their use of triptans or the continuity of these prescriptions. Adherence to triptans in individuals with migraine may reflect the individual's requirements and the effectiveness of triptans. Nevertheless, adherence to triptans has not been high in previous studies,^{9,26} which have reported that only 38.6%, 47.3%, and 42.9% of first-time triptan buyers repurchased triptans within 1 year, 2 years, and 5 years, respectively.⁹ Fourth, this study did not capture the economic, social, and geographic characteristics of triptan users and non-users. Identification of the economic and socio-geographical characteristics of triptan users and non-users may provide insights

into the economic, social, and geographical barriers to triptan use.²⁷ Therefore, although this study focused on the longitudinal trends of triptan use in Korea, future studies should explore the economic, social, and geographical characteristics of triptan users and non-users to provide more insights into the use of triptans. Fifth, we defined the diagnosis of migraine according to the ICD-10 code in the NHIS database; thus, discrepancies from the actual diagnoses could exist owing to the inherent nature of the claims data.

In conclusion, this study showed that the annual use of triptans, number of prescriptions for triptans, proportion of prescriptions for triptans among patients with migraine, and annual per capita use of triptans in Korea consistently increased from 2002 to 2019. This continued increase in triptan use demonstrates that they are effective in treating migraine, suggesting an increasing need for effective migraine treatments. However, considering that only approximately one-tenth of migraine sufferers used triptans in 2019, the use of triptans remains low. Moreover, given that the migraine-prescribing rates vary according to medical specialties, an increased understanding of migraine among physicians and migraine patients is required.

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