

Analysis of Healthcare Utilization for Primary Dysmenorrhea in Korea: A Retrospective, Cross-Sectional Study

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Purpose: This study is a retrospective, cross-sectional study aiming to present basic data on the treatment modalities and cost of care for primary dysmenorrhea (PD) by analyzing healthcare utilization and patient distributions using the 2010 to 2018 Health Insurance Review and Assessment Service (HIRA) data.

Patients and Methods: We used the HIRA-National Patient Sample (NPS) data to analyze medical service utilization for PD (ICD-10 code: N94.4, N94.6) in Western medicine (WM) or Korean medicine (KM) care between January 2010 and December 2018.

Results: There were 41,139 patients diagnosed with PD who utilized Western medicine (WM) or Korean medicine (KM) care at least once during the study period. The number of claims and patients steadily rose over the years from 7430 claims for 3989 patients in 2010 to 11,523 claims for 6226 patients in 2018. The predominant age group was 15 to 24 years. Regarding the frequency of service categories for PD in the claims, consultation was the most common and costly service category in WM (72,120 cases, 47.89%; 631,912 USD, 69.74%), while injection and analogous treatments was the most common and costly service category in KM (97,157 cases, 72.41%; 314,696 USD, 55.86%). Regarding the drug prescriptions, nonsteroidal anti-inflammatory drugs (NSAIDs) (26,617 cases, 40.47%) were the most frequently prescribed drug for PD in pharmacies and hospitals.

Conclusion: The result shows an annual increase in healthcare utilization for PD with the fastest rate in individuals aged 15 to 24 years. This study provides data on the current utilization of WM and KM care for PD for policymakers. Furthermore, we analyzed the frequency and cost of common treatment modalities in WM and KM, which would be useful data for clinicians and researchers.

Keywords: primary dysmenorrhea, healthcare administrative claims, health care costs, medical use

Introduction

Primary dysmenorrhea (PD) is defined as periodic cramps and pain originating from the uterus during the menstrual period, and it is the most common gynecological disease among women of reproductive age.¹ PD is not linked to a clear pathological pelvic disease and tends to first occur in women aged 20 years or younger after the ovulation cycle. Pain occurs within a few hours of the menstrual bleeding and peaks on the first or second day.² Intense pain is limited to a specific lower abdominal quadrant and radiates to the inner thigh.³ PD is generally diagnosed based on the presence of pain and elimination of abnormal signs in the pelvic cavity based on history taking and examination.⁴

The prevalence of PD varied widely across previous studies. It ranged from 16 to 91% among women of reproductive age, with 2 to 29% suffering from extremely severe pain.⁵ According to a study that analyzed research conducted on adolescents and young women (≤ 30 years) worldwide, 34 to 94% of the women suffer from dysmenorrhea.⁶ Furthermore, one study reported that the prevalence can range from 15 to 75% because of the heterogeneity in the study criteria and population.⁷ The prevalence is 87–90% among Korean women, and 10–25.6% have reported severe symptoms.⁸ Despite the markedly high prevalence, women with PD tend to engage in self-treatment.⁹ While the general

treatment goals of PD are reported to be symptom improvement and reduction of work-loss or school-loss days,¹⁰ the majority of female students who suffer from PD only took over-the-counter drugs or tried nonpharmacological remedies, and did not frequently receive professional medical care at healthcare facilities.

Western Medicine (WM) treatments for PD can be broadly divided into pharmacological and nonpharmacological treatments.¹⁰ Studies generally report that treatments involving nonsteroidal anti-inflammatory drugs (NSAIDs)¹¹ or hormonal contraceptives¹² to reduce prostaglandins and leukotrienes are effective.¹³ Furthermore, several studies evaluated lifestyle changes,¹⁴ nonpharmacological treatments and complementary and alternative medicine (CAM) treatments for PD,¹⁵ including nutritional method, exercises, and Korean Medicine (KM).^{10,16} CAM treatments can be chosen as medical interventions to prevent or alleviate PD.¹⁷ Recent studies introduced several CAM treatment modalities for PD, including acupuncture, acupressure, moxibustion,^{18,19} muscle relaxation,²⁰ nutritional functional foods,²¹ and aromatherapy.^{22–24} A study suggested that acupuncture can more effectively reduce PD and relevant symptoms compared to NSAIDs and that the therapeutic effects are retained in the short term.²⁵

According to Akiyama's five-year study utilizing the Japan Health Insurance (JMDC) database from 2009,²⁶ patients had approximately one day of therapy (DOT) for every 45 days due to dysmenorrhea (ICD-10 code N94.4, N94.6). The average total cost of health management per year was about 2.2 times greater in PD group, and the excess cost was generally incurred by outpatient care. The annual pharmacy cost was also about 2.6 times higher in the PD group than in the control group. Furthermore, PD has a strong impact on patients' lives. According to a Japanese study,²⁷ 27.3% of women missed school or work at least one day in six months, and 50% of women with PD in Sweden have been absent to work or school at least once due to menstrual pain, which is approximately 230,000 work loss days.¹

Statistics on the disease codes that comprise PD (ICD-10 code N94.4 and N94.6) from the 2018 National Health Insurance Statistical Yearbook of Korea²⁸ show that 236,558 patients utilized outpatient healthcare service with the reimbursed cost of care totaling 10.3 billion KRW, showing that the NHI spending for PD is not low.

Previous studies specifically analyzed the prevalence of PD by age and country and observed that there is substantial consequent economic loss. Moreover, many studies assessed the general treatment modalities used for PD and their effectiveness.^{21,29–31} However, studies that investigate the overall healthcare utilization for PD and the specific cost of each service are lacking. While studies conducted in Japan²⁶ and Taiwan³² reported healthcare utilization for PD and secondary dysmenorrhea, there is insufficient research data, necessitating national-level epidemiology studies to investigate the cost of healthcare utilization and types of treatments.

Based on the insufficient evidence from previous studies and the importance to examine the prevalence and treatments of PD for appropriate guidelines, this study was conducted under the aim to present the clinical treatment trends for PD and examine the changes in healthcare utilization.

Materials and Methods

Study Design Data Source

This study was a retrospective, cross-sectional, descriptive study used the Health Insurance Review and Assessment Service-National Patient Sample (HIRA-NPS) data from January 2010 to December 2018. The data are massive and cover 460 million patients annually, which accounts for 90% of the Korean population, under the NHI system. As of 2011, the data comprise claims received from approximately 80,000 healthcare providers nationwide.³³ The NPS data include claims received for a randomly selected 3% of the entire Korean population (about 1.4 million as of 2018) stratified by sex (2 strata) and age (16 strata). This is secondary data statistically sampled from the raw data after de-identification and contains claims submitted each year from the date of initial care for the corresponding year. It is generated when healthcare providers submit their claims for reimbursement of the cost of care to the National Health Insurance Service (NHIS), and it is highly useful for healthcare research owing to the detailed and diverse types of information (details of care [eg, treatment, medical procedure, diagnostic test, prescription], diagnosis, the amount paid by the insurer, patient's out-of-pocket cost, patient demographics, and information about care facility).

Study Population

In this study, we included patients who received WM or KM care at least once with ICD-10 code N94.4 (primary dysmenorrhea) or N94.6 (dysmenorrhea, unspecified) as the main diagnosis between 2010 and 2018.²⁶

Among the claims submitted with KCD code N94.4 or N94.6, those with codes for the dental institution, public health facility, or psychiatry, institution types as nursing hospital, psychiatric long-term care hospital, dental hospital, maternity facility, or public health facility, and total cost of care or number of days in care entered as 0 or missing were excluded.

Study Outcomes

To analyze the frequency and percentage of utilization of WM and KM institutions, the selected patients were classified by age and payer type. Age was divided into six 10-year age groups from < 15 years to ≥ 55 years, and payer type was categorized into NHI and Medicaid. Except for the people in the lowest income level, which is subsidized by taxes and covered by Medicaid, all Koreans are forced to take part in national health insurance. Thus, NHI and Medicaid are representative of the patient's household economic status. Age was further divided based on time to visualize the number of people utilizing healthcare per year using graphs. The type of visit was categorized into outpatient and inpatient, and the medical institution was classified into tertiary hospital/general hospital/hospital, clinic, KM hospital, and KM clinic. The total number of patients utilizing each medical institution and average visits per patient for each year were graphed. The specific results for the number of patients, total claims, total costs, per-patient costs, and per-claim costs were also analyzed.

According to the Ministry of Health and Welfare (MOHW) criteria, service categories were classified into injection and analogous treatments, consultation, testing, medication administration, inpatient care, procedure and surgery, other, special equipment, and diagnostic imaging. The annual average number of cases, annual growth rate of cases, annual average cost, and annual growth rate of cost and the results for five practices (service codes) in the KM claims are evaluated.

Medications were categorized according to the Anatomical Therapeutic Chemical Classification System-code (ATC code) of each drug according to the MOHW criteria, and the total number of prescriptions and costs, as well as the annual average number of prescriptions, growth rate of prescriptions, average total cost, and growth rate of the total cost, were assessed for each category ([Supplementary Table 1](#)).

In this study, all costs are the cost spent by a health insurance subscriber at a healthcare institution, and it is the allowed cost (sum of NHIS payment and patient's out-of-pocket cost) from the total cost claimed by a medical institution.

Statistical Analysis

Based on the objective of the study and the imbalance of the size of the two (WM and KM) groups, this study employed a descriptive approach instead of a direct statistical comparison of the two groups. The basic characteristics of the patients are presented as the number of patients and percentage. The frequency and costs of each service category and prescription category were analyzed. Types of healthcare services were defined to analyze the frequency and total costs. All prescribed medicines were categorized by ATC codes. The average annual log change (as growth rate) of each category were investigated. All cost values were converted to USD based on the 2018 average KRW to USD exchange rate and adjusted using the price index of healthcare cost of the corresponding year ([Supplementary Table 2](#)). The data were analyzed using SAS software (version 9.4, SAS Institute, Cary, NC, USA).

Results

Flowchart of the Study Sample

A total of 112,771 claims contained ICD-10 code N94 (Pain and other conditions associated with female genital organs and menstrual cycle) between 2010 and 2018. Among them, 33,529 claims without N94.4 (primary dysmenorrhea) or N94.6 (Dysmenorrhea, unspecified) as the diagnosis, 244 claims with a code for dental institution, public health institution, or psychiatry, 248 claims with the type of institution as nursing hospital, psychiatric nursing hospital, dental hospital, maternity facility, or public health facility, and 182 claims with total cost or number of days in care as 0 or missing were excluded. As a result, 78,568 claims for 41,139 patients were selected for analysis in this study ([Figure 1](#)).

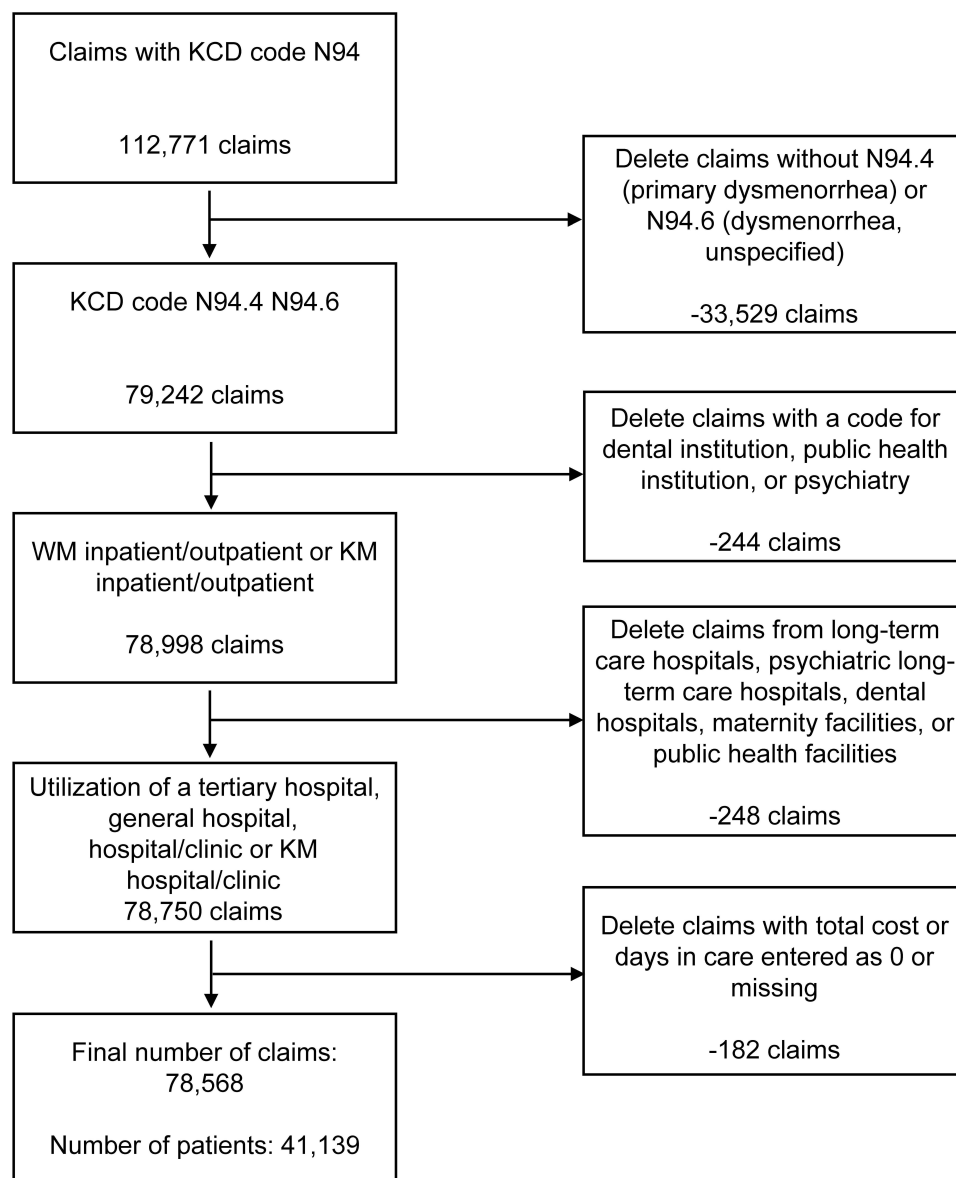


Figure 1 Flowchart of the study sample. Patients diagnosed with primary dysmenorrhea were further assessed by the type of medical institution and medical services received to ensure population homogeneity and data quality.

Abbreviations: KCD, Korean Classification of Diseases; WM, Western Medicine; KM, Korean Medicine.

Basic Characteristics of Patients and Medical Claims

The predominant age group utilizing medical institutions in Korea (WM and KM) with PD as the main diagnosis was 15 to 24 years ($n=19,201$, 46.67%), followed by 25 to 34 years ($n=11,535$, 28.04%) and 35 to 44 years ($n=6150$, 14.95%), showing that the number of patients utilizing health care tended to decrease with advancing age. The predominant age groups visiting WM and KM facilities were in the same order. Specifically, the percentage of patients in the first two age groups that only utilized KM care were similar, at 38.97% and 34.47%, respectively. Regarding the route of the hospital, 32,065 patients only sought WM care (77.94%), while 8427 patients only sought KM care (20.48%), showing that 98.42% of the total (41,139) only utilized one type of healthcare institution. The type of insurance was NHI ($n=39,978$, 97.18%) or Medicaid ($n=1161$, 2.82%), and there was little difference in this ratio between WM and KM (Table 1). We analyzed the changes in the number and percentage of patients in the eight-year period by age group. The percentage of the 15 to 24 years group rose most substantially from 42.99% in 2010 to 55.08% in 2018. The number of patients in this

Table 1 Basic Characteristics of Patients

| Category | | Total (n = 41,139) | | Western Medicine (n = 32,065) | | Korean Medicine (n = 8427) | | Both (n = 647) | |
|------------|----------|-----------------------|---------|----------------------------------|--------------------|-------------------------------|-------|-------------------|-------|
| | | Number of Patients | Percent | Percent | Number of Patients | Percent | | | |
| Age | < 15 | 2114 | 5.14 | 1469 | 4.58 | 603 | 7.16 | 42 | 6.49 |
| | 15–24 | 19,201 | 46.67 | 15,564 | 48.54 | 3284 | 38.97 | 353 | 54.56 |
| | 25–34 | 11,535 | 28.04 | 8470 | 26.42 | 2905 | 34.47 | 160 | 24.73 |
| | 35–44 | 6150 | 14.95 | 4772 | 14.88 | 1305 | 15.49 | 73 | 11.28 |
| | 45–54 | 2094 | 5.09 | 1751 | 5.46 | 324 | 3.84 | 19 | 2.94 |
| | ≥ 55 | 45 | 0.11 | 39 | 0.12 | 6 | 0.07 | – | – |
| Payer type | NHI | 39,978 | 97.18 | 31,147 | 97.14 | 8210 | 97.42 | 620 | 95.83 |
| | Medicaid | 1161 | 2.82 | 918 | 2.86 | 217 | 2.58 | 27 | 4.17 |

Abbreviation: NHI, National Health Insurance.

group also rose twofold from 1715 in 2010 to 3429 in 2018. The percentages of other age groups remained consistent over the years (Figure 2). Regarding the type of visit, 99.69% of the claims were for outpatient care, and 0.31% were for inpatient care. Regarding the type of medical institution in WM, 64.37% were from a primary health care facility (clinic level), and 35.62% were from a tertiary hospital/general hospital/hospital, but in KM, 95.82% of the claims were from a primary health care facility, showing a higher utilization of primary healthcare facilities compared to that in WM (Supplementary Table 3).

General Medical Usage for Patients in Korea

The total number of patients that sought healthcare (WM and KM) in Korea rose by 55.34% from 4060 in 2010 to 6307 in 2018. Moreover, the total number of claims also rose by 55.09% from 7430 claims in 2010 to 11,523 claims in 2018, and total cost increased by 115.93% from 116,254 USD in 2010 to 251,032 USD in 2018 (Supplementary Table 4). However, the annual average visits per patient remained steady over the years at 1.5 in WM and 3.5 in KM (Figure 3).

High-Frequency Service Category for Primary Dysmenorrhea

In over nine years, injection and analogous treatments were the most common service category (126,414 cases, 44.39%), followed by consultation (104,512, 36.7%) and testing (30,979 cases, 10.88%). In WM, consultation was the most common (72,120 cases, 47.98%), followed by testing (30,979 cases, 20.57%) and injection and analogous treatments (29,257 cases, 19.43%). In KM, injection and analogous treatments were the most common (97,157 cases, 72.41%), followed by consultation (32,392 cases, 24.14%) and medication administration (2912 cases, 2.17%). Regarding total cost in this period, consultation incurred the highest (863,747 USD, 58.78%), followed by injection and analogous treatments (351,941 USD, 23.95%) and testing (120,555 USD, 8.2%). In WM, consultation incurred the highest cost (631,912 USD, 69.74%), followed by testing (120,555 USD, 13.31%). In KM, injection and analogous treatments incurred the highest cost (314,696 USD, 55.86%), followed by consultation (231,835 USD, 41.15%) (Table 2). Between 2010 and 2018, all of the service categories in WM increased, whereas the majority of service categories in KM declined (Supplementary Table 5).

The service codes for KM practices were categorized into five categories, and frequencies were analyzed for the nine-year period. Acupuncture was most commonly performed (54,269 cases), followed by moxibustion (13,775 cases) and heat-cold meridian therapy (11,696 cases). Furthermore, acupuncture incurred the highest cost (204,594 USD), followed by

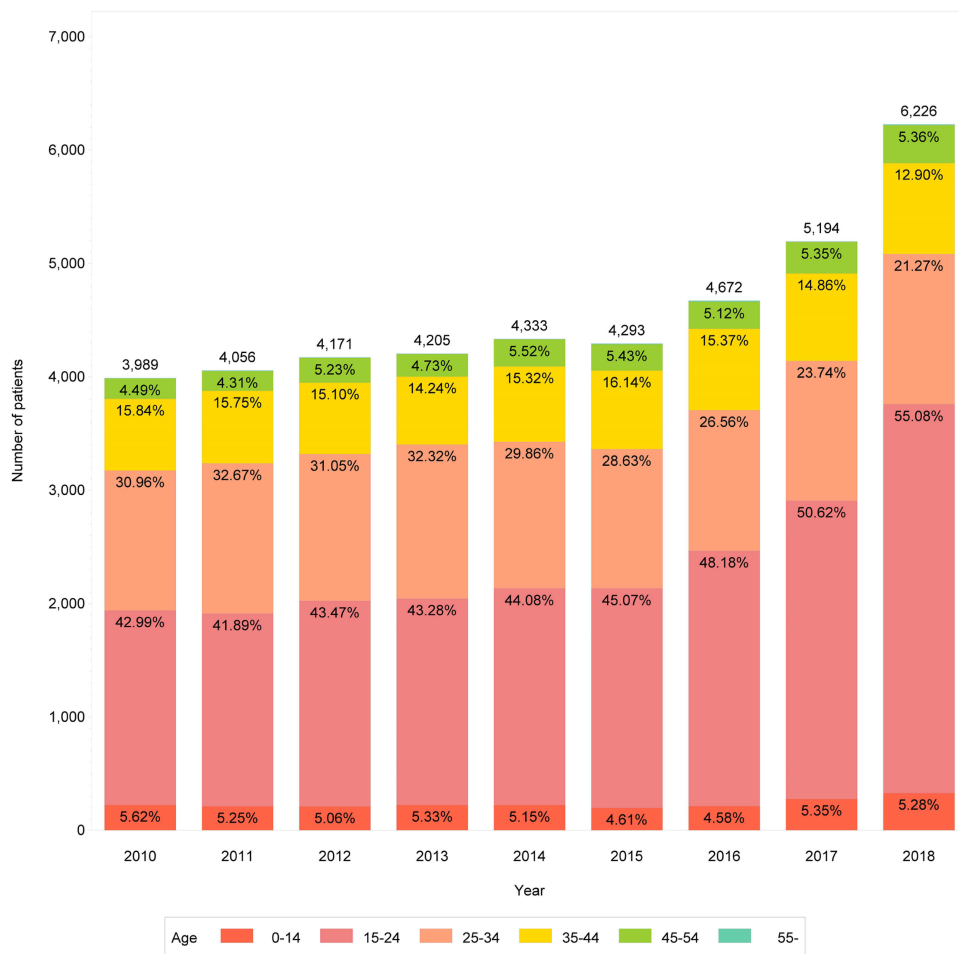


Figure 2 Annual number and proportion of patients by age groups. Each bar graph refers to the number of patients each year, and age groups are identified in different colors.

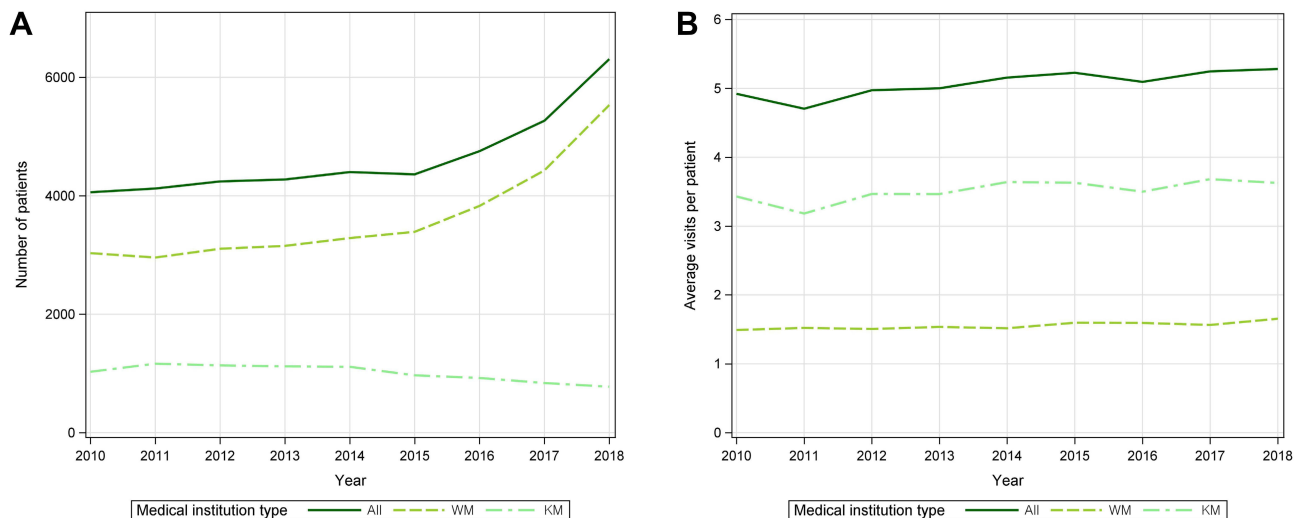


Figure 3 Annual trends of (A) total number of patient visits and (B) average number of visits per patient by medical institution. The number of patients increased over time, while average visits per patients were consistent over time. **Abbreviations:** WM, Western Medicine; KM, Korean Medicine.

Table 2 High Frequency Service Category for Primary Dysmenorrhea

| Service Category | Total | | | | Western Medicine | | | | Korean Medicine | | | |
|--|--------------------|---------|---------------------|---------|--------------------|---------|---------------------|---------|--------------------|---------|---------------------|---------|
| | Number of Services | Percent | Total Costs (\$) ** | Percent | Number of Services | Percent | Total Costs (\$) ** | Percent | Number of Services | Percent | Total Costs (\$) ** | Percent |
| Injection and analogous treatments* | 126,414 | 44.39 | 351,941.59 | 23.95 | 29,257 | 19.43 | 37,245.49 | 4.11 | 97,157 | 72.41 | 314,696.10 | 55.86 |
| Consultation | 104,512 | 36.7 | 863,747.66 | 58.78 | 72,120 | 47.89 | 631,912.26 | 69.74 | 32,392 | 24.14 | 231,835.40 | 41.15 |
| Testing | 30,979 | 10.88 | 120,555.88 | 8.2 | 30,979 | 20.57 | 120,555.88 | 13.31 | – | – | – | – |
| Medication administration | 15,284 | 5.37 | 52,165.38 | 3.55 | 12,372 | 8.22 | 45,144.88 | 4.98 | 2912 | 2.17 | 7020.50 | 1.25 |
| Hospitalization | 4589 | 1.61 | 39,673.75 | 2.7 | 2975 | 1.98 | 32,953.37 | 3.64 | 1614 | 1.2 | 6720.38 | 1.19 |
| Procedure/surgery | 2341 | 0.82 | 26,698.16 | 1.82 | 2341 | 1.55 | 26,698.16 | 2.95 | – | – | – | – |
| Special equipment and diagnostic imaging | 202 | 0.07 | 2531.83 | 0.17 | 202 | 0.13 | 2531.83 | 0.28 | – | – | – | – |
| Other | 430 | 0.15 | 12,114.69 | 0.82 | 335 | 0.22 | 9036.82 | 1 | 95 | 0.07 | 3077.87 | 0.55 |

Notes: *Korean medicine treatments including acupuncture, cupping, and moxibustion are reimbursed under the category of "injection and analogous treatments" in Korean national health insurance system; **All costs adjusted for the healthcare and medical service price index were converted using the annual average exchange rate (KRW/USD)); \$: United States Dollar (USD). (see [Supplementary Table 2](#)).

Table 3 Frequently Prescribed Medicine for Primary Dysmenorrhea

| Category | Number of Prescriptions | Total Costs (\$)* | Annual Average Number of Prescriptions | Growth Rate (%) | Annual Average Costs (\$)* | Growth Rate (%) |
|---|-------------------------|-------------------|--|-----------------|----------------------------|-----------------|
| Non-steroidal anti-inflammatory drugs | 26,617 | 38,743.74 | 2957 | 11.22 | 4304.86 | 6.41 |
| Drugs for functional gastrointestinal disorders | 13,225 | 18,492.71 | 1469 | 11.51 | 2054.75 | 8.10 |
| Drugs for acid related disorders | 9034 | 11,308.05 | 1004 | 19.24 | 1256.45 | 19.40 |
| Other analgesics (included acetaminophen) | 6420 | 4981.85 | 713 | 16.81 | 553.54 | 12.35 |
| Antibiotics | 3977 | 7109.59 | 442 | 7.85 | 789.95 | 7.09 |
| Blood substitutes | 2359 | 3489.92 | 262 | 12.02 | 387.77 | 19.88 |
| Sex hormones and Modulators of the genital system | 897 | 51,640.05 | 100 | 9.39 | 5737.78 | 25.15 |
| Anxiolytics | 859 | 351.00 | 95 | -1.51 | 39.00 | -2.03 |
| Other gastrointestinal disorders | 284 | 487.00 | 32 | 12.90 | 54.11 | 7.48 |
| Muscle relaxants, Centrally acting agents | 238 | 296.79 | 26 | 12.12 | 32.98 | 8.53 |
| Others | 1857 | 4952.21 | 206 | 15.06 | 550.25 | -9.51 |

Notes: *All costs adjusted for the healthcare and medical service price index were converted using the annual average exchange rate (KRW/USD); \$: United States Dollar (USD). (see [Supplementary Table 2](#)).

moxibustion (34,275 USD) and cupping (25,913 USD). The per-patient average annual cost was 25.18 USD for acupuncture, 13.37 USD for electroacupuncture, and 12.75 USD for cupping therapy ([Supplementary Table 6](#)).

Frequently Prescribed Medicine for Primary Dysmenorrhea

In KM, packaged medicinal herbs are most frequently prescribed, but because it is not covered by the NHIS, prescriptions were excluded from the analysis. We analyzed all prescribed drugs in WM without differentiating whether it was filled at a pharmacy or hospital. The most frequently prescribed drug was NSAIDs (26,617 cases), followed by drugs for functional gastrointestinal disorders (13,225 cases) and drugs for acid-related disorders (9034 cases). The drug associated with the highest cost was sex hormones and modulators of the genital system (51,640.05 USD), followed by NSAIDs (38,743.74 USD) and drugs for functional gastrointestinal disorders (18,492.71 USD) ([Table 3](#)).

Discussion

This study analyzed the characteristics of patients with PD, treatment modalities, cost of care, and annual distributions using the HIRA-NPS data from 2010 to 2018. The most common age group diagnosed with PD was 15 to 24 years ($n=19,201$, 46.67%), and healthcare utilization for PD in this age group doubled during this period. The number of patients seeking healthcare (including WM and KM) for PD steadily rose over the years, and it has rapidly increased since 2015. Aside from consultation, testing was the most frequently billed service category in WM, while injection and analogous treatments were the most frequently billed service category in KM. NSAIDs were the most frequently prescribed drugs for PD.

Of the 3% random sample from the entire Korean population, 4571 individuals (41,139 for nine years) utilized healthcare for PD every year, which accounts for 0.331% of the 1.4 million sample population ([Figure 1](#)). Compared to

the prevalence of PD among female college students reported in a Chinese cross-sectional study (41.7%)³⁴ and that reported in a Spanish cross-sectional study (76%),³⁵ the rate of healthcare utilization by Koreans was low compared to the prevalence, even after considering that the number of people who sought healthcare may be slightly larger because we only analyzed health insurance claims data. The reason that women suffering from PD rarely seek healthcare has been examined in a previous online survey study.³⁶ Furthermore, considering that patients tend to take a symptomatic approach to treat PD using over-the-counter drugs, as opposed to seeking professional healthcare,³⁷ this may suggest that the percentage of patients with PD requiring medical intervention or the awareness of treatment options is low. Moreover, the results imply that patients manage their PD through conservative treatment or self-care measures such as aerobics or exercise.^{38–40} Our results are consistent with that of a study on Canadian women with PD that these women are likely to resort to non-prescribed treatments, as opposed to prescribed drugs, for pain relief.⁴¹

The results of this study show that healthcare utilization for PD in Korea is gradually on the rise in recent years. Considering that the per-patient average number of visits remained steady, the increase in healthcare utilization can be attributable to an actual increase in healthcare utilization by a greater number of patients and not due to unnecessary healthcare. Specifically, [Figure 2](#) shows that the number of claims from obstetrics and gynecology (OB/GYN) for patients aged 15 to 24 years and the number of patients in this age group dramatically rose from around 2016. This shows that there have been many changes in the utilization of OB/GYN care among single women since the publication of a 2014 study by the Korea Institute for Health and Social Affairs on the need to change the perception of single women who avoid utilizing OB/GYN care. There has been an effort to transform the perception about OB/GYN care in Korean society, as evident by the major policy changes to expand health insurance coverage to human papillomavirus (HPV) vaccine⁴² and a 2015 grounded theory study identifying the negative social perception about single women visiting OB/GYN.⁴³ However, more detailed policy studies are needed to determine whether the health insurance coverage and study attempting to change perception have directly contributed to the increased OB/GYN utilization. An example is the increased healthcare utilization by the older adult population after changes in policies, such as lowering out-of-pocket costs and raising the upper limit of a fixed out-of-pocket cost system for adults aged 65 years or older in Korea.⁴⁴

In WM, testing incurred the highest cost, followed by medication administration, injection and analogous treatments, hospitalization, treatment, and surgery. In KM, injection and analogous treatments incurred the highest cost, followed by medication administration, hospitalization, and others. Moreover, we further divided Korean treatments into five service codes ([Supplementary Table 6](#)) and observed that acupuncture incurred the highest cost, followed by moxibustion and cupping therapy. In contrast, in WM, testing, including general laboratory tests, urine microscopes, and electrolyte tests, incurred the highest cost. In practice, PD is differentiated from secondary dysmenorrhea through the laboratory.⁴⁵ Laboratory testing is considered essential to the diagnosis of dysmenorrhea, which is speculated to be the reason for the high percentage of cost spent on this service category. After differential diagnosis, PD is traditionally treated through pharmacologic therapeutic options. Surgical treatment is not supported by sufficient evidence⁴⁶ and is recommended as the last resort,⁴⁷ which may be the reason for the low percentage of “other” service categories.

Service codes related to physiotherapy are not shown in our statistical data, presumably because OB/GYN clinics often lack physiotherapy-related facilities and equipment due to the nature of diseases. Past studies suggested that physiotherapy modalities such as transcutaneous electrical nerve stimulation (TENS)^{48,49} or kinesio taping can improve pain associated with PD and enhance patients’ quality of life. A Japanese study⁵⁰ also reported that patients tend to prefer alternative medicine to treat PD due to the effectiveness of nonpharmacologic therapeutic options and patients’ perception.^{3,9,36,51} However, we can speculate that the total number of claims and cost were highest for acupuncture in KM⁵² because acupuncture and cupping therapy are covered by insurance and are employed as the main treatment modalities.⁵³ Similarly, moxibustion and cupping therapy are often coupled with acupuncture in KM, which explains their high percentages in the cost analysis for different service codes. Past studies have reported that acupuncture is significantly effective in treating PD^{24,25,54} and suggested that moxibustion may also be effective.^{19,55–57} The Korean government launched a pilot project for expanding NHI coverage to packaged medicinal herbs in November 2020 for certain diseases with high health insurance coverage needs, including PD.⁵⁸ As the demands for KM care are expected to rise among patients with PD as a result of the pilot project, we expect many relevant studies to be conducted in the coming years.

As shown in Table 3, the most frequently prescribed drug for PD in all WM institutions is NSAIDs, followed by drugs for functional gastrointestinal and acid-related disorders. NSAIDs are widely used to relieve acute or chronic pain,^{59,60} and foreign study findings show that NSAIDs are effective on PD.^{61–63} Foreign guidelines that recommend the priority use of NSAIDs in treating PD⁴⁷ are consistent with our prescription frequency results. Moreover, we can speculate that drugs for functional gastrointestinal and acid-related disorders are also frequently prescribed^{64,65} to resolve the gastrointestinal side effect induced by NSAIDs.^{66,67}

The findings of this study on the current trend of healthcare utilization by patients with PD are nationally representative. Moreover, this is the first study to analyze WM and KM care for PD in reflection of the unique dichotomized healthcare system in Korea. We shed light on basic trends of the medical cost and treatment frequencies for PD using the national HIRA-NPS data that encompass all age groups and regions. Hence, the findings will be useful for further research on WM and KM care for PD.

This study has a few limitations. First, while the data contain information about healthcare utilization for PD in the corresponding years, it is difficult to conclude that the patients received treatments listed in the claims solely for PD. According to a previous study,⁶⁸ the diagnostic accuracy of health insurance claims data is approximately 70. To address this, we only included those with PD as the main diagnosis; however, we could not isolate treatments for PD and those for other diseases. Second, the study data are not a continuous but annually repeated and cross-sectional. Cohort studies will be needed if patients with PD need follow-up in the long term. Third, we could not analyze the clinical manifestations and severity of PD. Additional studies are needed to examine healthcare utilization according to its clinical symptoms. Fourth, the claims data only contained 201 service categories for KM, which is substantially fewer than 5611 service categories in WM, showing that many KM service categories are not covered by health insurance.

Conclusions

This study examined the trends of healthcare utilization for PD (types and cost of treatment for PD) in Korea using the HIRA-NPS data. We observed that it is low compared to its prevalence and that healthcare utilization for PD is increasing in Korea over the years in contrast to foreign reports that patients tend to prefer home remedies and self-care for PD. The total cost of care also increased. In WM, the cost for consultation and testing accounted for the greatest percentage, while in KM, injection and analogous treatments (acupuncture followed by moxibustion and hot-cold meridian therapy) and consultation incurred the highest cost. Considering that not many studies have analyzed the trends of healthcare utilization for PD at the national level, this study that encompassed WM and KM care provides valuable information about PD for professionals such as health policymakers, clinicians, and researchers, and the findings would be useful as foundational data for relevant pilot projects and policy decision making.

Abbreviations

PD, primary dysmenorrhea; WM, Western Medicine; NSAIDs, nonsteroidal anti-inflammatory drugs; CAM, complementary and alternative medicine; KM, Korean Medicine; JMDC, Japan Health Insurance; DOT, day of therapy; HIRA, Health Insurance Review and Assessment Service; MOHW, Ministry of Health and Welfare; ATC code, Anatomical Therapeutic Chemical Classification System-code; OB/GYN, obstetrics and gynecology; HPV, human papillomavirus; TENS, transcutaneous electrical nerve stimulation.

Data Sharing Statement

Patient Samples can be obtained via the website of HIRA by filling out the End User Agreement of the Patient Samples. The Patient Samples are provided in a DVD (text file) format and a fee for the samples is subject to be charged. <https://opendata.hira.or.kr/home.do>.

Ethics Approval and Informed Consent

This study protocol was approved by the public data provision deliberation committee in the HIRA and conducted according to relevant guidelines and regulations. It was reviewed and qualified as an exemption by the Institutional Review Board of Jaseng Hospital of Korean Medicine, Seoul, Korea (2021-05-002). All study participants provided

informed consent, and the study design was approved by the appropriate ethics review board. The principles expressed in the Declaration of Helsinki have been adhered to in the analysis.

Author Contributions

All authors made substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; took part in drafting the work or revising it critically for important intellectual content; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare no conflicts of interest.

References

1. Iacovides S, Avidon I, Baker FC. What we know about primary dysmenorrhea today: a critical review. *Hum Reprod Update*. 2015;21(6):762–778. doi:10.1093/humupd/dmv039
2. Mirbagher-Ajorpaz N, Adib-Hajbaghery M, Mosaebi F. The effects of acupressure on primary dysmenorrhea: a randomized controlled trial. *Complement Ther Clin Pract*. 2011;17(1):33–36. doi:10.1016/j.ctcp.2010.06.005
3. Balbi C, Musone R, Menditto A, et al. Influence of menstrual factors and dietary habits on menstrual pain in adolescence age. *Eur J Obstet Gynecol Reprod Biol*. 2000;91(2):143–148. doi:10.1016/S0301-2115(99)00277-8
4. Taylor D, Miaskowski C, Kohn J. A randomized clinical trial of the effectiveness of an acupressure device (relief brief) for managing symptoms of dysmenorrhea. *J Altern Complement Med*. 2002;8(3):357–370. doi:10.1089/10755530260128050
5. Ju H, Jones M, Mishra G. The prevalence and risk factors of dysmenorrhea. *Epidemiol Rev*. 2014;36(1):104–113. doi:10.1093/epirev/mxt009
6. De Sanctis V, Soliman AT, Elsedfy H, Soliman NA, Elalaily R, El Kholy M. Dysmenorrhea in adolescents and young adults: a review in different countries. *Acta Biomed*. 2016;87(3):233–246.
7. Harlow SD, Ephross SA. Epidemiology of menstruation and its relevance to women's health. *Epidemiol Rev*. 1995;17(2):265–286. doi:10.1093/oxfordjournals.epirev.a036193
8. Cha NH, Sok SR. Effects of auricular acupressure therapy on primary dysmenorrhea for female high school students in South Korea. *J Nurs Scholarsh*. 2016;48(5):508–516. doi:10.1111/jnu.12238
9. O'Connell K, Davis AR, Westhoff C. Self-treatment patterns among adolescent girls with dysmenorrhea. *J Pediatr Adolesc Gynecol*. 2006;19(4):285–289. doi:10.1016/j.jpag.2006.05.004
10. Ryan SA. The treatment of dysmenorrhea. *Pediatr Clin*. 2017;64(2):331–342. doi:10.1016/j.pcl.2016.11.004
11. Chan W. Prostaglandins and nonsteroidal antiinflammatory drugs in dysmenorrhea. *Annu Rev Pharmacol Toxicol*. 1983;23(1):131–149. doi:10.1146/annurev.pa.23.040183.001023
12. Davis AR, Westhoff CL. Primary dysmenorrhea in adolescent girls and treatment with oral contraceptives. *J Pediatr Adolesc Gynecol*. 2001;14(1):3–8. doi:10.1016/S1083-3188(00)00076-0
13. Zahradnik H-P, Hanjalic-Beck A, Groth K. Nonsteroidal anti-inflammatory drugs and hormonal contraceptives for pain relief from dysmenorrhea: a review. *Contraception*. 2010;81(3):185–196. doi:10.1016/j.contraception.2009.09.014
14. Doğan H, Eroğlu S, Akbayrak T. The effect of kinesio taping and lifestyle changes on pain, body awareness and quality of life in primary dysmenorrhea. *Complement Ther Clin Pract*. 2020;39:101120. doi:10.1016/j.ctcp.2020.101120
15. Khan KS, Champaneria R, Latthe PM. How effective are non-drug, non-surgical treatments for primary dysmenorrhoea? *BMJ*. 2012;344(may14 1):e3011–e3011. doi:10.1136/bmj.e3011
16. DOĞAN H, Caltekin MD, Taylan O, Kirmizi DA, Başer E, Yalvac ES. Approaches of dealing with primary dysmenorrhea and relationship between kinesiphobia and pain severity. *Konuralp Med J*. 2020;12(3):551–556.
17. Gharloghi S, Torkzahrani S, Akbarzadeh AR, Heshmat R. The effects of acupressure on severity of primary dysmenorrhea. *Patient Prefer Adherence*. 2012;6:137. doi:10.2147/PPA.S27127
18. Tian-Hua W. Effects of moxibustion or acupoint therapy for the treatment of primary dysmenorrhea: a meta-analysis. *Altern Ther Health Med*. 2014;20(4):33.
19. Yang M, Chen X, Bo L, et al. Moxibustion for pain relief in patients with primary dysmenorrhea: a randomized controlled trial. *PLoS One*. 2017;12(2):e0170952. doi:10.1371/journal.pone.0170952
20. Azima S, Bakhshayesh HR, Kaviani M, Abbasnia K, Sayadi M. Comparison of the effect of massage therapy and isometric exercises on primary dysmenorrhea: a randomized controlled clinical trial. *J Pediatr Adolesc Gynecol*. 2015;28(6):486–491. doi:10.1016/j.jpag.2015.02.003
21. Yu A. Complementary and alternative treatments for primary dysmenorrhea in adolescents. *Nurse Pract*. 2014;39(11):1–12. doi:10.1097/01.NPR.0000454984.19413.28

22. Apay SE, Arslan S, Akpınar RB, Celebioglu A. Effect of aromatherapy massage on dysmenorrhea in Turkish students. *Pain Manag Nurs.* 2012;13(4):236–240. doi:10.1016/j.pmn.2010.04.002
23. Han S-H, Hur M-H, Buckle J, Choi J, Lee MS. Effect of aromatherapy on symptoms of dysmenorrhea in college students: a randomized placebo-controlled clinical trial. *J Altern Complement Med.* 2006;12(6):535–541. doi:10.1089/acm.2006.12.535
24. Witt CM, Reinhold T, Brinkhaus B, Roll S, Jena S, Willich SN. Acupuncture in patients with dysmenorrhea: a randomized study on clinical effectiveness and cost-effectiveness in usual care. *Am J Obstet Gynecol.* 2008;198(2):166.e1–166. e8. doi:10.1016/j.ajog.2007.07.041
25. Woo HL, Ji HR, Pak YK, et al. The efficacy and safety of acupuncture in women with primary dysmenorrhea: a systematic review and meta-analysis. *Medicine.* 2018;97(23):e11007. doi:10.1097/MD.00000000000011007
26. Akiyama S, Tanaka E, Cristeau O, Onishi Y, Osuga Y. Evaluation of the treatment patterns and economic burden of dysmenorrhea in Japanese women, using a claims database. *CEOR.* 2017;9:295. doi:10.2147/CEOR.S127760
27. Osuga Y, Hayashi K, Kobayashi Y, et al. Dysmenorrhea in Japanese women. *Int J Gynaecol Obstet.* 2005;88(1):82–83. doi:10.1016/j.ijgo.2004.09.004
28. National_Health_Insurance_Service. Healthcare bigdata hub. Available from: <http://opendata.hira.or.kr/op/opc/olap4thDsInfo.do>. Accessed July 27, 2022.
29. Durain D. Primary dysmenorrhea: assessment and management update. *J Midwifery Women's Health.* 2004;49(6):520–528. doi:10.1016/j.jmwh.2004.08.013
30. Guimaraes I, Póvoa AM. Primary dysmenorrhea: assessment and treatment. *Revista Brasileira de Ginecologia e Obstetrícia.* 2020;42(8):501–507. doi:10.1055/s-0040-1712131
31. Sharghi M, Mansurkhani SM, Larky DA, et al. An update and systematic review on the treatment of primary dysmenorrhea. *JBRA Assist Reprod.* 2019;23(1):51. doi:10.5935/1518-0557.20180083
32. Pan J-C, Tsai Y-T, Lai J-N, Fang R-C, Yeh C-H. The traditional Chinese medicine prescription pattern of patients with primary dysmenorrhea in Taiwan: a large-scale cross sectional survey. *J Ethnopharmacol.* 2014;152(2):314–319. doi:10.1016/j.jep.2014.01.002
33. Kim L, Kim J-A, Kim S A guide for the utilization of HIRA national patient samples. National Health Insurance Service; 2020.
34. Hu Z, Tang L, Chen L, Kaminga AC, Xu H. Prevalence and risk factors associated with primary dysmenorrhea among Chinese female university students: a cross-sectional study. *J Pediatr Adolesc Gynecol.* 2020;33(1):15–22. doi:10.1016/j.jpjag.2019.09.004
35. Fernández-Martínez E, Onieva-Zafra MD, Parra-Fernández ML. The impact of dysmenorrhea on quality of life among Spanish female university students. *Int J Environ Res Public Health.* 2019;16(5):713. doi:10.3390/ijerph16050713
36. Chen CX, Shieh C, Draucker CB, Carpenter JS. Reasons women do not seek health care for dysmenorrhea. *J Clin Nurs.* 2018;27(1–2):e301–e308. doi:10.1111/jocn.13946
37. Nie W, Xu P, Hao C, Chen Y, Yin Y, Wang L. Efficacy and safety of over-the-counter analgesics for primary dysmenorrhea: a network meta-analysis. *Medicine.* 2020;99(19):e19881. doi:10.1097/MD.00000000000019881
38. Dehnavi ZM, Jafarnejad F, Kamali Z. The effect of aerobic exercise on primary dysmenorrhea: a clinical trial study. *J Educ Health Promot.* 2018;7(1):3. doi:10.4103/jehp.jehp_79_17
39. Abaraogu UO, Tabansi-Ochiogu CS, Igwe ES. Effectiveness of exercise therapy on pain and quality of life of patients with primary dysmenorrhea: a systematic review with meta-analysis. *Turk J Phys Med Rehabil.* 2016;62(4). doi: 10.5606/tftrd.2016.95580
40. Kirmizigil B, Demiralp C. Effectiveness of functional exercises on pain and sleep quality in patients with primary dysmenorrhea: a randomized clinical trial. *Arch Gynecol Obstet.* 2020;302(1):153–163. doi:10.1007/s00404-020-05579-2
41. Burnett MA, Antao V, Black A, et al. Prevalence of primary dysmenorrhea in Canada. *J Obstet Gynaecol Can.* 2005;27(8):765–770. doi:10.1016/S1701-2163(16)30728-9
42. Kim MA, Han GH, Kim JH, Seo K. Current Status of Human Papillomavirus Infection and Introduction of Vaccination to the National Immunization Program in Korea: an Overview. *J Korean Med Sci.* Dec 24 2018;33(52):e331. doi:10.3346/jkms.2018.33.e331
43. Ej L. A grounded theory analysis on unmarried women's experiences and perceptions of visit to the hospital specialized in obstetrics and gynecology. a grounded theory analysis on unmarried women's experiences and perceptions of visit to the hospital specialized in obstetrics and gynecology. *Korean Soci Sci Art.* 2015;20:349–364. doi:10.17548/ksaf.2015.06.20.349
44. Kim M-H, Kwon S-M. The effect of outpatient cost sharing on health care utilization of the elderly. *J Prev Med Public Health.* 2010;43(6):496–504. doi:10.3961/jpmp.2010.43.6.496
45. Osayande AS, Mehulic S. Diagnosis and initial management of dysmenorrhea. *Am Fam Physician.* 2014;89(5):341–346.
46. Latthe P, Proctor M, Farquhar C, Johnson N, Khan K. Surgical interruption of pelvic nerve pathways in dysmenorrhea: a systematic review of effectiveness. *Acta Obstet Gynecol Scand.* 2007;86(1):4–15. doi:10.1080/00016340600753117
47. Lefebvre G, Pinsonneault O, Antao V, et al. Primary dysmenorrhea consensus guideline. *J Obstet Gynaecol Can.* 2005;27(12):1117–1146.
48. Wang SF, Lee JP, Hwa HL. Effect of transcutaneous electrical nerve stimulation on primary dysmenorrhea. *Neuromodulation.* 2009;12(4):302–309. doi:10.1111/j.1525-1403.2009.00226.x
49. Tugay N, Akbayrak T, Demirtürk F, et al. Effectiveness of transcutaneous electrical nerve stimulation and interferential current in primary dysmenorrhea. *Pain Med.* 2007;8(4):295–300. doi:10.1111/j.1526-4637.2007.00308.x
50. Ohde S, Tokuda Y, Takahashi O, Yanai H, Hinohara S, Fukui T. Dysmenorrhea among Japanese women. *Int J Gynaecol Obstet.* 2008;100(1):13–17. doi:10.1016/j.ijgo.2007.06.039
51. Akin MD, Weingand KW, Hengehold DA, Goodale MB, Hinkle RT, Smith RP. Continuous low-level topical heat in the treatment of dysmenorrhea. *Obstet Gynecol.* 2001;97(3):343–349.
52. Park H-L, Lee H-S, Shin B-C, et al. Traditional medicine in China, Korea, and Japan: a brief introduction and comparison. *Evid-Based Complement Altern Med.* 2012;2012:1–9. doi:10.1155/2012/429103
53. Huang C-W, Hwang I-H, Lee Y-S, et al. Utilization patterns of traditional medicine in Taiwan and South Korea by using national health insurance data in 2011. *PLoS One.* 2018;13(12):e0208569. doi:10.1371/journal.pone.0208569
54. Shetty GB, Shetty B, Moovanthan A. Efficacy of acupuncture in the management of primary dysmenorrhea: a randomized controlled trial. *J Acupunct Meridian Stud.* 2018;11(4):153–158. doi:10.1016/j.jams.2018.04.001
55. Nie R, Huang S, Liao W, Mao Z, Li X, Xiong J. Moxibustion for primary dysmenorrhea: a protocol for evidence-based clinical practice guideline. *Medicine.* 2021;100(7):e24466. doi:10.1097/MD.00000000000024466

56. Yang J, Xiong J, Yuan T, et al. Effectiveness and safety of acupuncture and moxibustion for primary dysmenorrhea: an overview of systematic reviews and meta-analyses. *Evid-Based Complement Altern Med.* 2020;2020: 8306165.
57. Zhu Y, Chen R-L, Le J, Miao F-R. Efficacy observation of primary dysmenorrhea treated with isolated-herbal moxibustion on Shenque (CV 8). *Zhongguo Zhen Jiu.* 2010;30(6):453–455.
58. Hong J-E. Changes of healthcare environment and the role of the health insurance review and assessment service from the viewpoint of Korean Medicine Society. *HIRA.* 2021;1(1):91–97. doi:10.52937/hira.21.1.1.91
59. Huynh M-P, Yagiela JA. Current concepts in acute pain management. *J Calif Dent Assoc.* 2003;31(5):419–427.
60. Portenoy RK. Current pharmacotherapy of chronic pain. *J Pain Symptom Manage.* 2000;19(1):16–20. doi:10.1016/S0885-3924(99)00124-4
61. Bitner M, Kattenhorn J, Hatfield C, Gao J, Kellstein D. Efficacy and tolerability of lumiracoxib in the treatment of primary dysmenorrhoea. *Int J Clin Pract.* 2004;58(4):340–345. doi:10.1111/j.1368-5031.2004.00179.x
62. Daniels SE, Talwalker S, Torri S, Snabes MC, Recker DP, Verburg KM. Valdecoxib, a cyclooxygenase-2-specific inhibitor, is effective in treating primary dysmenorrhea. *Obstet Gynecol.* 2002;100(2):350–358.
63. Marjoribanks J, Proctor M, Farquhar C, Sangkomkamhang US, Derks RS. Nonsteroidal anti-inflammatory drugs for primary dysmenorrhoea. *Cochrane Database Syst Rev.* 2003;4:1.
64. Tsumura H, Tamura I, Tanaka H, et al. Prescription of nonsteroidal anti-inflammatory drugs and co-prescribed drugs for mucosal protection: analysis of the present status based on questionnaires obtained from orthopedists in Japan. *Intern Med.* 2007;46(13):927–931. doi:10.2169/internalmedicine.46.0003
65. Scheiman JM, Yeomans ND, Talley NJ, et al. Prevention of ulcers by esomeprazole in at-risk patients using non-selective NSAIDs and COX-2 inhibitors. *J Am Coll Gastroenterol.* 2006;101(4):701–710. doi:10.1111/j.1572-0241.2006.00499.x
66. Chiba T, Sato K, Kudara N, et al. Upper gastrointestinal disorders induced by non-steroidal anti-inflammatory drugs. *Inflammopharmacology.* 2008;16(1):16–20. doi:10.1007/s10787-007-1578-0
67. Laine L. Approaches to nonsteroidal anti-inflammatory drug use in the high-risk patient. *Gastroenterology.* 2001;120(3):594–606. doi:10.1053/gast.2001.21907
68. Park B, Sung J, Park K, Seo S, Kim S. *Studying on Diagnosis Accuracy for Health Insurance Claims Data in Korea.* Seoul: Seoul National University; 2003: 17–29.

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