Factors associated with the use of pharmacopuncture in addition to acupuncture in South Korea
An analysis of a nationally representative panel

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Abstract

Pharmacopuncture is a widely used Korean medicine treatment, but its usage patterns and associated factors remain unclear. This study aimed to explore factors related to the use of pharmacopuncture alongside acupuncture and investigate the associated medical cost burden in South Korea. We analyzed the 2019 Korea Health Panel Annual Data, focusing on adult outpatients who received acupuncture alone or both acupuncture and pharmacopuncture (PA). We employed individual-level and visit-level approaches, using chi-square tests, t-tests, and binary logistic regression for analysis. Among 1280 patients, 10% were PA users. Logistic regression showed that PA use was significantly associated with being aged 30 to 49 (odd ratio [OR] = 2.531; P = .009), having an education level of elementary school or lower (OR = 2.571; P = .011), and being in the 2nd (OR = 1.914; P = .041) or 3rd income percentile (OR = 1.925; P = .020). Of 13,101 medical visits, 5.80% involved PA, with PA visits incurring significantly higher costs than acupuncture only visits (KRW 4438.33 vs 14,700.16; P < .001). Arthritis, shoulder disorders, and other joint conditions were more prevalent among PA visits (P < .001). This study reveals socioeconomic factors influencing pharmacopuncture use and highlights potential health inequalities in its access in South Korea. The higher costs associated with PA visits suggest a need for considering its inclusion in health insurance coverage. Future research should focus on the effectiveness, cost-effectiveness, and standardization of pharmacopuncture to address unmet healthcare needs and inform policy decisions.

Abbreviations: ACU = acupuncture only, CI = confidence interval, KHPAD-2019 = the 2019 Korea Health Panel Annual Data, KM = Korean medicine, NHIS = National Health Insurance Service, OR = odd ratio, PA = pharmacopuncture and acupuncture.

Keywords: herbal injection, KHPAD-2019, Korean medicine, pharmacopuncture

1. Introduction

Pharmacopuncture is a new acupuncture treatment in Korean medicine (KM) that combines acupuncture based on meridian theories and herbal medicine based on qi and flavor theories[1] is primarily used in KM clinics. Since 2018, the Korean government has been managing pharmacopuncture quality by notifying the Accreditation System of External Herbal Dispensaries.[2] Notably, pharmacopuncture accounted for 28.4% of KM treatments used by Korean adult patients, with a ratio similar to that of herbal extracts (28.5%) or herbal decoctions (26.7%), as reported by the National Institute for Korean Medicine Development 2022 survey.[3] A bibliometric analysis revealed that research on pharmacopuncture, which was initially focused on musculoskeletal

pain, has been recently expanded to non-musculoskeletal diseases such as Parkinson disease and insomnia.[4]

Despite the frequent use of pharmacopuncture in South Korea, the specific diseases and patients for whom this treatment is being used in a clinical setting are not well known. As this treatment is a noninsured KM treatment, datasets from the National Health Insurance Service or the Health Insurance Review & Assessment Service lack information about it. Although some panel data include the use of noninsured KM treatments, including pharmacopuncture, the use of these treatments and related factors remain uninvestigated.

In some previous studies, the use of pharmacopuncture was analyzed in musculoskeletal patients who visited KM hospitals

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and clinics, but there are limitations in that they are not nationally representative and the subjects were limited to musculoskeletal patients.[5,6] Therefore, this study aimed to explore factors related to the use of pharmacopuncture in addition to acupuncture in South Korea using the 2019 Korea Health Panel Annual Data (KHPAD-2019), using both individual-level and visit-level approaches.

2. Methods

2.1. Dataset

This study utilized a cross-sectional design based on KHPAD-2019 data. The KHPAD-2019, jointly managed by the Korea Institute for Health and Social Affairs and National Health Insurance Service (NHIS), is a nationally representative panel that targets general households living in 17 cities and provinces in South Korea. KHPAD-2019 uses 90% of the 2015 Population and Housing Census data for national representativeness. Sample households were selected through a two-step proportional stratified cluster random sampling. This panel includes approximately 8500 households nationwide and members of these households. In this panel, researchers visit households in person every year and collect survey data from household members through the Computer Assisted Personal Interviewing.[7] This panel is a nationally representative panel and has been used as a dataset to analyze factors related to the use of KM services, including pharmacopuncture.[8]

2.2. Inclusion criteria

2.2.1. Inclusion criteria of this study. Household members visiting medical institutions meeting the following inclusion criteria were analyzed in this study: (a) adult patients aged ≥ 19 years; (b) visits to KM outpatient medical institutions (i.e., clinics); and (c) patients who received acupuncture alone or both acupuncture and pharmacopuncture. Patients who received physical therapy commonly used in combination with acupuncture, including infrared and Teding Diancibo Pu lamps irradiation, were allowed. The physical therapy variable investigated in KHPAD-2019 refers to physical therapy excluding Chuna therapy or manual therapy. Notably, 85.2% of the medical visits of interest in the current study used physical therapy combined with acupuncture. However, patients who received other KM treatments, including moxibustion, cupping therapy, herbal decoction, herbal extracts, Chuna therapy, and manual therapy, were excluded.

2.2.2. Individual-level approach. Individuals who had used pharmacopuncture as well as acupuncture more than once in 2019 were classified as "PA users," and individuals who had never used pharmacopuncture and acupuncture (PA) and only used acupuncture were classified as "ACU users."

2.2.3. Visit-level approach. Individual medical visits of the household members were also analyzed. Specifically, the visits in which patients received both acupuncture and pharmacopuncture were classified as 'PA visits,' whereas the visits in which patients only received acupuncture were classified as "ACU visits."

2.3. Variables

2.3.1. Individual-level approach. The variables of the individual level analyzed in this study were patient characteristics including age, sex, education, region of residence, annual total income, employment status, insurance eligibility, and clinical variables. The beneficiaries of NHIS include employee insured (workplace-based), self-employed insured (community-based), and others (e.g., medical aid recipients). For the purposes of this analysis, we combined the employee insured and self-employed

insured groups. This approach is justified as both groups are fundamentally covered under NHIS, which provides a similar range of benefits and coverage. Therefore, in this study, insurance eligibility was divided into employee or self-employed insured and others. Clinical variables examined included the presence of disability, self-assessed health, perceived stress, depression, anxiety, and pain/discomfort levels.

2.3.2. Visit-level approach. The variables of the visit level analyzed in this study were as follow: (a) insurance plan used per visit (health insurance, medical aid, car insurance, industrial accident insurance, and others); (b) medical expenses per visit: total amount, out-of-pocket payments, noninsured expenses, discount or truncation, and national health insurance payments (Table 1);[9] (c) reason of treatment per visit: disease treatment or examination (diagnosis), rehabilitation and palliative care, accidents or poisoning, preventive care, and others; and (d) main diagnosis per visit: stroke, paralysis of the lower body or limbs, dementia, Parkinson disease, nervous system diseases (code: U23), facial nerve disorder, intervertebral disc disease, backache, arthritis, shoulder and other joint disorders, and others.

2.4. Statistical analysis

Regarding the individual-level approach, the chi-square test and independent *t*-test were used to compare the characteristic variables of the individuals included. Moreover, variables significantly related to being PA users were investigated through binary logistic regression analysis. The results were presented as odds ratio (OR) and 95% confidence interval (CI). Regarding the visit-level approach, the chi-square test and independent *t*-test were used to compare the insurance plan used per visit, medical expenses per visit, reason of treatment per visit, and main diagnosis per visit. For categorical variables with small expected frequencies, Fisher exact test was used instead of the chi-square test. Statistical significance was set at $P < .05$. PASW Statistics for Windows (version 18.0; SPSS Inc., Chicago, IL) was used for the statistical analysis.

2.5. Ethical consideration

This study was approved by the Institutional Review Board of Dong-Eui University Korean Medicine Hospital (DH-2023-08, approved on November 13, 2023).

3. Results

3.1. Included individuals and medical visits

The KHPAD-2019 included 219,106 medical visits by 11,591 adult patients in 2019. In this study, 13,101 medical visits by

Table 1

Definition of medical expenses variables.

Variables		Definitions
Medical expenses	Total amount	Total amount consisting of the medical expenses below
	Out-of-pocket payment	The amount of medical expenses for medical services covered by health insurance minus the National Health Insurance payments
	Noninsured expenses	The amount of medical expenses that are not covered by health insurance and are borne entirely by the patient
	Discount or truncation	Trimmed amount or discount amount at medical institutions
	National Health Insurance payment	The amount of medical expenses charged and paid by the medical institution that provided the medical service to the National Health Insurance Service

1280 patients (11.04% of the total adult patients) meeting the inclusion criteria were included and analyzed. Among the 1280 individuals, there were 1152 acupuncture only (ACU) users (90%) and 128 PA users (10%), and among 13,101 medical visits, there were 12,341 ACU visits (94.20%) and 760 PA visits (5.80%) (Fig. 1).

3.2. Patient characteristics

The mean age of ACU users were 60.02 ± 14.39, and that of PA users were 58.95 ± 14.69, with no statistically significant difference ($P = .426$). The proportion of women among ACU users and PA users was 66.32% and 61.72%, respectively, showing no statistically significant difference ($P = .298$). In terms of education level, the proportion of the patients with elementary school or below was significantly higher among the PA users (25.26% vs 33.59%; $P = .042$). Further, compared with the patients among the ACU users, the proportions of patients among PA users in Gwangju/Jeolla/Jeju were significantly higher (14.41% vs 21.09%; $P = .045$). No significant differences in total income were found across all percentiles (all, $P > .05$). Additionally, no significant differences were observed between the 2 groups in employment status and insurance eligibility (both, $P > .05$). Among clinical variables, significant differences between the 2 groups were observed in self-assessed health. Specifically, the proportion of ACU users responding with good self-assessed health was significantly higher than that of PA users (32.99% vs 24.22%; $P = .044$) (Table 2).
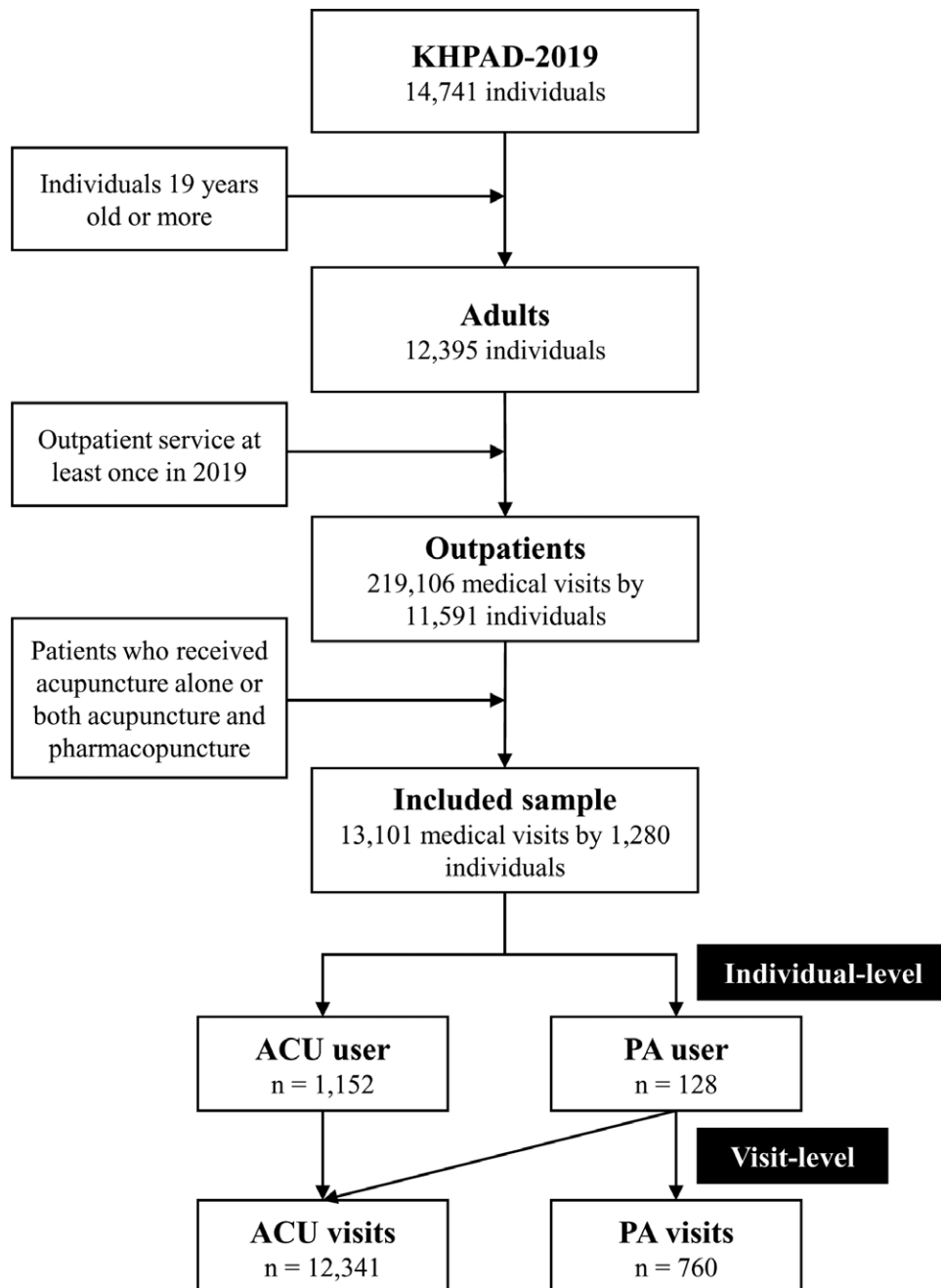

Figure 1. Included individuals and visits of this study. ACU = acupuncture only; KHPAD-2019 = the 2019 Korea Health Panel Annual Data; KM = Korean medicine; PA = pharmacopuncture and acupuncture.

3.3. Factors associated with being PA users

Multivariate regression analysis found that specific categories within age, education level, and annual total income were significantly associated with being PA users. According to the findings, being in the 30 to 49 age group (OR = 2.531; 95% CI = 1.262 to 5.076; P = .009) compared to being 65 years or older, having an education level of elementary school or lower (OR = 2.571; 95% CI = 1.245 to 5.306; P = .011) compared to college or higher, and being in the 2nd (OR = 1.914; 95% CI = 1.026 to 3.568; P = .041) or 3rd percentile (OR = 1.925; 95% CI = 1.108 to 3.346; P = .020) compared to the 4th percentile of annual total income were significantly positively related to being PA users. Among the clinical variables investigated, none showed a significant relationship with being PA users (Table 3).

3.4. Analysis of individual medical visits

3.4.1. Insurance plan used per visit.
Compared with ACU visits, the insurance plan used in PA visits were significantly more often health insurance (90.1% vs 99.6%; P < .001), whereas other type of plan, such as medical aid (7.4% vs 0.1%; P < .001) or car insurance (2.1% vs 0.3%; P < .001), were significantly lower (Table 4).

3.4.2. Medical expenses.
All variables associated with medical expenses were significantly higher for PA visits than for ACU visits. Specifically, compared with ACU visits, PA visits had significantly higher total amount (KRW 4438.33 vs 14,700.16; P < .001), out-of-pocket payment (KRW 1898.47 vs 2980.53; P < .001), noninsured expenses (KRW 284.35 vs 5472.48; P < .001), and national health insurance payment (KRW 12,856.00 vs 14,635.12; P < .001) (Table 4).

3.4.3. Reason of treatment.
Compared with patients classified under ACU visits, those classified under PA visits had significantly more reasons for disease treatment or examination (92.2% vs 97.9%; P < .001), and significantly fewer reasons for rehabilitation and palliative care (1.3% vs 0%; P < .001) and accident or poisoning (6.3% vs 1.6%; P < .001) (Table 4).

3.4.4. Main diagnosis.
Compared with ACU visits, the occurrence of Parkinson disease (2.6% vs 0%; P < .001), facial nerve disorders (1.2% vs 0.3%; P = .018), and intervertebral disc disease (23.6% vs 16.9%; P < .001) was lower among the PA visits. However, arthritis (21.6% vs 30.5%; P < .001) and shoulder and other joint disorders (36.3% vs 42.5%; P < .001) were significantly more common among the PA visits than among the ACU visits. No statistically significant differences were observed for other diseases (all P > .05) (Table 4).

Table 2

Patient characteristics of ACU users and PA users.

Variables		ACU users (n = 1152)	PA users (n = 128)	X^2 or t (P-value)†
Age (yr)	19–29	26 (2.26%)	1 (0.78%)	1.215 (.511)‡
	30–49	254 (22.05%)	36 (28.13%)	2.427 (.119)
	50–64	366 (31.77%)	39 (30.47%)	0.090 (.764)
	65+	506 (43.92%)	52 (40.63%)	0.510 (.475)
	Mean age (mean ± SD)	60.02 ± 14.39	58.95 ± 14.69	0.797 (.426)
Sex	Women	764 (66.32%)	79 (61.72%)	1.084 (.298)
Education level	Elementary school or below	291 (25.26%)	43 (33.59%)	4.148* (.042)
	Middle or high school	524 (45.49%)	51 (39.84%)	1.482 (.223)
	College above	337 (29.25%)	34 (26.56%)	0.405 (.524)
Region	Seoul/Gyeonggi/Incheon	348 (30.21%)	33 (25.78%)	1.080 (.299)
	Gangwon	43 (3.73%)	1 (0.78%)	3.023 (.119)‡
	Daejeon/Chungcheong/Sejong	264 (22.92%)	35 (27.34%)	1.261 (.261)
	Gwangju/Jeolla/Jeju	166 (14.41%)	27 (21.09%)	4.019* (.045)
	Busan/Daegu/Ulsan/Gyeongsang	331 (28.73%)	32 (25%)	0.790 (.374)
Annual total income§	1st percentile	307 (26.65%)	26 (20.31%)	2.403 (.121)
	2nd percentile	245 (21.27%)	36 (28.13%)	3.162 (.075)
	3rd percentile	273 (23.70%)	39 (30.47%)	2.865 (.091)
	4th percentile	327 (28.39%)	27 (21.09%)	3.061 (.080)
Employment status	Active	614 (53.30%)	77 (60.16%)	2.181 (.140)
Insurance eligibility (ref. medical aid or others)	Employee or self-employed insured	857 (74.39%)	93 (72.66%)	0.181 (.670)
Disability	Presence	98 (8.51%)	8 (6.25%)	0.773 (.379)
Self-assessed health	Good	380 (32.99%)	31 (24.22%)	4.062* (.044)
	Fair	520 (45.14%)	65 (50.78%)	1.478 (.224)
	Poor	252 (21.88%)	32 (25%)	0.652 (.420)
Perceived stress	Very much	55 (4.77%)	7 (5.47%)	0.121 (.728)
	Much	283 (24.57%)	28 (21.88%)	0.454 (.501)
	A little	548 (47.57%)	63 (49.22%)	0.126 (.723)
	Rarely	266 (23.09%)	30 (23.44%)	0.008 (.930)
Depression	Presence	97 (8.42%)	13 (10.16%)	0.442 (.506)
Anxiety	Presence	64 (5.56%)	7 (5.47%)	0.002 (.968)
Pain/discomfort	Very much	616 (53.47%)	62 (48.44%)	1.172 (.279)
	Much	517 (44.88%)	65 (50.78%)	1.619 (.203)
	No	19 (1.65%)	1 (0.78%)	0.564 (.713)‡

ACU = acupuncture only; KRW = Korean Republic won; PA = pharmacopuncture and acupuncture; SD = standard deviation.

†This is the result of comparing this category with other categories.

‡Fisher exact test P-value.

§The higher the percentile, the higher the income.

*P < .05.

**P < .01.

4. Discussion

This is the first study in South Korea to conduct a detailed analysis of the use of pharmacopuncture in addition to acupuncture on a nationally representative panel. As pharmacopuncture is generally considered an additional treatment, this study compared the patients only received acupuncture (ACU users) with the patients received both acupuncture and pharmacopuncture (PA users). Also, the individual medical visits in which patients received only acupuncture (ACU visits) and those in which patients received both acupuncture and pharmacopuncture were compared (PA visits).

Among the included patients (n = 1280) in this study, 10% were PA users. Logistic regression analysis found that specific categories within age, education level, and annual total income were significantly related to being PA users, while clinical variables showed no significant associations. Specifically, being in the 30s to 40s, having a lower level of education, and having more favorable socioeconomic conditions were significantly positively associated with being PA users. Among the included medical visits (n = 13,101), 5.80% were PA visits. PA visits were associated with higher medical costs and showed significant differences from ACU visits in insurance plan used per visit, reasons of treatment, and main diagnosis.

The higher likelihood of less educated individuals being PA users may be based on their work environment. Individuals with lower education levels might be more likely to work in physically demanding occupations, potentially leading to a higher prevalence of musculoskeletal disorders.[10] As our results show that PA visits were more frequently associated with arthritis and joint disorders, this could explain the higher usage among this group. Another explanation is the potential difference in education level and purpose of KM use.[11] Previous research analyzing KHPAD revealed that individuals with a high level of education tend to use KM services for preventive purposes, and individuals with a low level of education tend to use KM services for therapeutic purposes.[11] In the current findings, the result that PA visits had significantly more reasons for disease treatment or examination than ACU visits can be understood in this context.

One of the main findings of this study was that the medical cost burden was significantly higher among PA visits than that among ACU visits. Considering that the mean noninsured expenses of ACU and PA visits are KRW 284.35 and 5472.48, respectively, the average price per case of pharmacopuncture (i.e., a kind of noninsured KM treatments) in clinical settings is approximately KRW 5200. Also interestingly, the average total amount for PA visits was 3.31 times the average total amount for ACU visits (KRW 4438.33 vs 14,700.16). This suggests that the use of acupuncture, an insured KM treatment, may be more complex or specialized in this population. For example, acupuncture performed on 2 or more areas, acupuncture performed on the abdomen, electroacupuncture, etc are more expensive than manual acupuncture performed on one area in KM clinics. This may imply that the higher costs in the PA group could be due to the greater variety or amount of additional acupuncture administered alongside pharmacopuncture. However, it is important to note that there are differences in disease distribution between the 2 groups, which could act as a confounding variable. Therefore, this interpretation should be made with caution, as the higher costs could also be influenced by the underlying diseases being treated rather than the variety of treatments alone. Future research should use multivariate analysis to better control for these confounding factors and provide a clearer understanding of the cost differences.

These differences in pharmacopuncture use related to the economic burden potentially result in unmet needs and health

Table 3

Factors associated with being PA users.

Variables		cOR (*P*-value)	95% CI	aOR (*P*-value)	95% CI
Age (yr) (ref. 65+)	19–29	0.374 (.340)	(0.050, 2.815)	0.704 (.743)	(0.087, 5.713)
	30–49	1.379 (.162)	(0.879, 2.165)	2.531** (.009)	(1.262, 5.076)
	50–64	1.037 (.871)	(0.670, 1.604)	1.476 (.153)	(0.865, 2.518)
Sex (ref. men)	Women	0.819 (.298)	(0.562, 1.193)	0.718 (.134)	(0.465, 1.108)
Education level (ref. College above)	Elementary school or below	1.465 (.116)	(0.910, 2.358)	2.571* (.011)	(1.245, 5.306)
	Middle or high school	0.965 (.877)	(0.612, 1.521)	1.281 (.396)	(0.724, 2.266)
Region (ref. Busan/Daegu/Ulsan/Gyeongsang)	Seoul/Gyeonggi/Incheon	0.981 (.941)	(0.590, 1.632)	1.053 (.847)	(0.622, 1.783)
	Gangwon	0.241 (.166)	(0.032, 1.805)	0.198 (.118)	(0.026, 1.511)
	Daejeon/Chungcheong/Sejong	1.371 (.221)	(0.827, 2.274)	1.370 (.234)	(0.816, 2.299)
	Gwangju/Jeolla/Jeju	1.682 (.061)	(0.975, 2.902)	1.613 (.099)	(0.914, 2.845)
Annual total income† (ref. 4th percentile)	1st percentile	1.026 (.929)	(0.586, 1.797)	1.138 (.716)	(0.567, 2.286)
	2nd percentile	1.780* (.032)	(1.052, 3.011)	1.914* (.041)	(1.026, 3.568)
	3rd percentile	1.730* (.037)	(1.032, 2.900)	1.925* (.020)	(1.108, 3.346)
Employment status (ref. non-active)	Active	1.323 (.141)	(0.912, 1.920)	1.235 (.331)	(0.807, 1.890)
Insurance eligibility (ref. medical aid or others)	Employee or self-employed insured	0.670 (.670)	(0.607, 1.379)	0.860 (.551)	(0.523, 1.413)
Disability	Presence	0.717 (.381)	(0.340, 1.510)	0.621 (.235)	(0.283, 1.362)
Self-assessed health (ref. poor)	Good	0.642 (.095)	(0.382, 1.079)	0.631 (.143)	(0.341, 1.168)
	Fair	0.984 (.945)	(0.628, 1.543)	0.947 (.834)	(0.568, 1.578)
Perceived stress (ref. rarely)	Very much	1.128 (.786)	(0.472, 2.700)	0.797 (.645)	(0.303, 2.097)
	Much	0.877 (.636)	(0.510, 1.508)	0.620 (.117)	(0.340, 1.128)
	A little	1.019 (.935)	(0.644, 1.613)	0.864 (.556)	(0.531, 1.406)
Depression	Presence	1.229 (.507)	(0.668, 2.263)	1.272 (.513)	(0.618, 2.617)
Anxiety	Presence	0.983 (.968)	(0.441, 2.194)	0.884 (.793)	(0.352, 2.220)
Pain/discomfort (ref. no)	Very much	1.912 (.531)	(0.252, 14.528)	1.467 (.721)	(0.180, 11.974)
	Much	2.389 (.400)	(0.315, 18.140)	1.854 (.558)	(0.234, 14.670)

Binary logistic regression was performed. Crude ORs were calculated using univariate logistic regression, and adjusted ORs were calculated using multivariate logistic regression. All independent variables considered in the multivariable analysis are listed in this table, including age, sex, education level, region of residence, annual total income, employment status, insurance eligibility, presence of disability, self-assessed health, perceived stress, depression, anxiety, and pain/discomfort levels.

aOR = adjusted odd ratio; CI = confidence interval; cOR = crude odd ratio; PA = pharmacopuncture and acupuncture.

†The higher the percentile, the higher the income.

*$P < .05$.

**$P < .01$.

Table 4

The differences in the variables of each visit.

Variables		Type of KM treatment used in each visit		
		ACU visits (n = 12,341)	**PA visits (n = 760)**	**X² or t (P-value)†**
Insurance plan used per visit (Unit: Visit, %)	Health insurance	11,115 (90.1%)	757 (99.6%)	76.640*** (.000)
	Medical aids	912 (7.4%)	1 (0.1%)	58.177*** (.000)‡
	Car insurance	255 (2.1%)	2 (0.3%)	12.103*** (.000)‡
	Industrial accident insurance	52 (0.4%)	0 (0%)	3.215 (.074)‡
	Other	7 (0.1%)	0 (0%)	0.431 (1.000)‡
Medical expenses per visit (Unit: KRW, mean ± SD)	Total amount	4438.33 ± 9012.13	14,700.16 ± 25,180.31	-25.801*** (.000)
	Out-of-pocket payment	1898.47 ± 2980.53	5341.25 ± 6747.60	-27.765*** (.000)
	Noninsured expenses	284.35 ± 5738.61	5472.48 ± 24,139.00	-17.246*** (.000)
	Discount or truncation	29.52 ± 98.43	575.705 ± 2720.72	-2.142* (.032)
	National health insurance payment	12,856.00 ± 12,742.31	14,635.12 ± 11,409.07	-3.757*** (.000)
Reason of treatment per visit (Unit: Visit, %)	Disease treatment or examination	11,374 (92.2%)	744 (97.9%)	33.873*** (.000)
	Rehabilitation and palliative care	156 (1.3%)	0 (0%)	9.723*** (.000)‡
	Accident or poisoning	782 (6.3%)	12 (1.6%)	28.463*** (.000)
	Preventive care	7 (0.1%)	0 (0%)	0.431 (1.000)‡
	Other	22 (0.2%)	4 (0.5%)	4.379 (.061)‡
Main diagnosis§ per visit (Unit: Visit, %)	Stroke	168 (1.5%)	8 (1.1%)	0.515 (.625)‡
	Paralysis of the lower body or limbs	0 (0%)	0 (0%)	N/A
	Dementia	0 (0%)	0 (0%)	N/A
	Parkinson disease	300 (2.6%)	0 (0%)	18.908*** (.000)‡
	Nervous system diseases (code: U23)	28 (0.2%)	0 (0%)	1.728 (.407)‡
	Facial nerve disorder	143 (1.2%)	2 (0.3%)	5.246* (.018)‡
	Intervertebral disc disease	2721 (23.6%)	126 (16.9%)	12.592*** (.000)
	Backache	531 (4.6%)	23 (3.1%)	2.880 (.099)
	Arthritis	2499 (21.6%)	227 (30.5%)	40.198*** (.000)
	Shoulder and other joint disorders	4197 (36.3%)	316 (42.5%)	18.170*** (.000)
	Other	962 (8.3%)	42 (5.6%)	5.208* (.023)

ACU = acupuncture only; KM = Korean medicine; N/A = not applicable; PA = pharmacopuncture and acupuncture; SD = standard deviation.

†This is the result of comparing this category with other categories.

‡Fisher exact test *P*-value.

§In main diagnosis, there were 6.42% and 2.11% missing values in ACU cases and PA cases, respectively.

*P < .05.

***P < .001.

inequalities in socioeconomically disadvantaged populations.[12] This study also indicates that the OR of being PA users was high in patients aged 30 to 49, compared to those aged ≥ 65 years. Additionally, compared to the 4th percentile of total annual income, the ORs of being PA users were significantly higher in more economically advantaged groups (the 3rd and 2nd percentile of total annual income). This suggests the potential for unmet needs and health inequalities associated with this treatment, particularly in older adults and economically vulnerable group. This is consistent with poverty among the older adults, which has recently emerged as an important health problem in South Korea.[13]

According to the National Institute for Korean Medicine Development's 2022 survey on KM use, 37.5% of the respondents believed that pharmacopuncture was expensive.[3] This suggests that pharmacopuncture is a major KM treatment and should be considered for reimbursement in the future. According to our findings, pharmacopuncture is frequently used along with acupuncture, especially in visits of arthritis or joint diseases, such as shoulder joints. Recently, the effectiveness of pharmacopuncture for the shoulder joint diseases including adhesive capsulitis[14] and rotator cuff diseases[15] have been reported. The results of research supporting the effectiveness and/or cost-effectiveness of pharmacopuncture for the diseases in which this treatment is frequently used in clinical settings can be referenced in the context of future health insurance coverage of KM treatments. Additionally, the challenges of pharmacopuncture include not only its effectiveness or cost-effectiveness, but also standardization of procedures and quality control.[5,16]

This study has some limitations. First, potentially important variables for individual visits may have been missed in this dataset. Importantly, the KHPAD-2019 classifies only 11 major diagnoses arising from the use of KM medical institutions. Although the proportion of main diagnoses included in "other" was <10%, potentially important diseases such as gastritis, tinnitus, and cancer reported in previous studies[17] may have been omitted. Second, as we analyzed KM use in 2019, subsequent annual changes must also be considered. In particular, the possibility of significant changes in the panel's medical use after 2020 because of the coronavirus disease of 2019 cannot be ruled out. Third, our analysis was limited to outpatient visits, excluding potential differences in the use and cost of pharmacopuncture in inpatient settings. Lastly, while we employed a logistic regression model to identify factors associated with pharmacopuncture use, unmeasured confounding factors could still influence our results. Future research should use more comprehensive datasets and multivariate analysis to better control for these confounding factors and provide a clearer understanding of the cost differences and usage patterns.

5. Conclusion

This study provides the first comprehensive analysis of pharmacopuncture use in addition to acupuncture using a nationally representative panel in South Korea. Our findings reveal that some socioeconomic factors such as age, education level, and annual total income significantly associated being user of both acupuncture and pharmacopuncture. Notably,

pharmacopuncture visits incurred higher medical costs and were more frequently associated with arthritis and joint disorders. These results highlight potential health inequalities in accessing pharmacopuncture in South Korea, particularly among older adults and economically vulnerable groups. As pharmacopuncture emerges as a major KM treatment, future research should focus on its effectiveness, cost-effectiveness, and standardization to inform potential health insurance coverage and address unmet healthcare needs.

Author contributions

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