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Use of Herbal Decoction and Pharmacopuncture in Individuals with Chronic Disease: findings from a nationally representative panel

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Objectives: This study analyzed the Korea Health Panel Annual Data 2019 to investigate factors related to the use of non-insured Korean medicine (KM) treatment in individuals with chronic diseases. The non-insured KM treatments of interest were herbal decoction (HD) and pharmacopuncture (PA).
Methods: Among adults aged 19 or older, 6,159 individuals with chronic diseases who received outpatient KM treatment at least once in 2019 were included. They were divided into three groups according to the KM treatment used: (1) basic insured KM non-pharmacological treatment (BT) group (n = 629); (2) HD group (n = 256); (3) PA group (n = 184). Logistic regression analysis was used to explore factors associated with favoring HD or PA use over BT. Potentially relevant candidate factors were classified using the Andersen Behavior Model.
Results: Compared to BT, the 1st to 3rd quartiles of income compared to the 4th quartile (odds ratio: 1.50 to 2.06 for HD; 2.03 to 2.83 for PA), health insurance subscribers compared to medical aid (odds ratio: 2.51; 13.43), and presence of musculoskeletal diseases (odds ratio: 1.66; 1.91) were significantly positively associated with HD and PA use. Moreover, the presence of cardiovascular disease (odds ratio: 1.46) and neuropsychiatric disease (odds ratio: 1.97) were also significantly positively associated with HD use.
Conclusion: The presence of some chronic diseases, especially musculoskeletal diseases, was significantly positively associated with HD and PA use, while low economic status was significantly negatively associated with HD and PA use, indicating the potential existence of unmet medical needs in this population. Since chronic diseases impose a considerable health burden, the results of this study can be used for reference for future health insurance coverage policies in South Korea.

Keywords: Korea health panel annual data 2019, herbal decoction, pharmacopuncture, Korean medicine, logistic regression

INTRODUCTION

South Korea, along with China, Japan, and Taiwan, has modernized Traditional East Asian Medicine (TEAM) and uses it in its national medical system [1]. According to the <2022 Survey on the Use of Korean Medicine and Herbal Medicine Consumption>, conducted by the National Institute for Korean Medicine Development, Korean medicine (KM) is commonly used by the general population (71.0%) [2]. This survey found that "expansion of insurance coverage" was the biggest issue in KM (34.7%) [2], with an increased number of outpatient visits for non-insured KM services [3]. As evidence suggests KM

treatment's effectiveness in various clinical areas, we assume there are gaps between the medical needs of KM users and insurance coverage. However, health insurance covers only basic KM treatments, such as acupuncture, moxibustion, and cupping [4].

In South Korea, the prevalence of chronic diseases is rapidly increasing due to changes in the environment and the population composition and increased life expectancy, resulting in increased disease burden and necessitating urgent national-level management strategies [5]. In Korea, chronic diseases are associated with the frequent use of medical services [6]. Chronic disease in a household member is significantly related to the household's exposure to catastrophic health expenditures [7]. This cost has important implications for policy revision of public health insurance coverage [8]. Therefore, healthcare utilization by individuals with chronic diseases is relevant to health insurance policies. Similarly, in the United States, the prevalence of chronic diseases is approximately 50%, which accounts for 86% of total medical costs [9]. Recent studies have shown that KM treatments have positive effects on disc diseases, osteoarthritis, shoulder pain, back pain, sprains, facial nerve paralysis, stroke, digestive system diseases, common colds, or rhinitis [10]. According to a previous study, the number of chronic conditions has a significant positive relationship with KM healthcare utilization [11]. Additionally, the presence of a disability closely related to chronic disease is also associated with the frequent use of KM services [12]. These studies indicate that KM plays a crucial role in managing chronic diseases and suggest the

need for insurance coverage for KM treatment in the context of chronic disease management [12].

The <2022 Survey on the Use of Korean Medicine and Herbal Medicine Consumption> found that the general public wants expanded insurance coverage for KM treatments [2]. However, it is unclear what role economic factors play in the utilization of non-insured KM treatments. Further study is warranted to determine whether expanded insurance coverage would increase KM treatment use.

This study aimed to analyze the status of herbal decoction (HD) and pharmacopuncture (PA) use, major non-insured KM treatments, and the factors affecting their use among individuals with chronic diseases in KM outpatient settings.

MATERIALS AND METHODS

1. Study design

This study investigated the utilization status and factors related to major non-insured KM treatments among adults with chronic diseases. This descriptive research study used the Korea Health Panel Annual Data 2019 (KHPAD-2019).

2. Subjects and data collection

We obtained the data used from KHPAD-2019. This panel (established by the Korea Institute for Health and Social Affairs and the National Health Insurance Service) provides basic data

Table 1. Definition of the groups of interest

KM treatments variables	Only insured KM Tx.	Including non-insured KM Tx.	
	BT group (n = 629)	HD group (n = 256)	PA group (n = 184)
Acupuncture	◯ 1 or more	△	△
Moxibustion		△	△
Cupping therapy		△	△
HD	✕	◯	△
Herbal medicine for nourishment (e.g., GJD)	✕	△	△
Herbal medicine preparations	✕	△	△
PA	✕	△	◯
Chuna	✕	△	△
Manual therapy	✕	△	△
Other KM physical therapy (e.g., IR)	△	△	△

◯, Use; △, No limit; ✕, Not use.
BT, basic insured Korean medicine non-pharmacological treatment; GJD, Gongjindan; HD, herbal decoction; IR, infrared radiation; KHPAD, Korea Health Panel Annual Data; KM, Korean medicine; PA, pharmacopuncture; Tx, treatment.

related to the use of medical services, economic activity, health level, and healthcare policy. In this panel, we selected subjects using two-stage stratification to reflect the entire population group in South Korea. Data were collected through interviews during direct household visits.

This KHPAD-2019 included 14,741 subjects, of which 12,395 were adults aged 19 or older, 6,037 had chronic diseases, and 1,149 used outpatient KM services. We excluded 12 individuals with chronic diseases who received KM treatment (inpatient or outpatient) covered through auto insurance in South Korea. Accordingly, the remaining 1,137 subjects of this study were classified into the following three groups according to the types of KM treatment used (Table 1; Fig. 1).

(1) Basic insured KM non-pharmacological treatment (BT) group: This group used acupuncture, moxibustion, or cupping but did not use other KM treatments. However, no restrictions were applied to KM physical therapy, such as infrared irradiation, commonly combined with acupuncture. Among the subjects, 629 individuals were eligible for this study group. As this study analyzed the characteristics of patients with chronic diseases who receive non-insured KM treatments despite the cost,

this group was defined as the reference group.

(2) HD group: This group used HD as the main therapy, with or without other KM treatments. There were 256 individuals eligible for this group.

(3) PA group: This group used PA as the main therapy, with or without other KM treatments. There were 184 individuals eligible for this study group.

3. Anderson Model

This study used the Anderson Model or Behavior Model of Service Utilization [13] to analyze the status of HD and PA use (major non-insured KM treatments) and the factors affecting their use.

1) Predisposing factors

We identified age, sex, education level, and residential region were predisposing factors. Age was classified according to life cycle as 19-29 years (young people), 30-49 years (younger middle-aged), 50-64 years (older middle-aged), and 65 years or older (elderly). Education level was classified as elementary or below, middle or high school, and college and above. Residence was classified as Seoul/Gyeonggi/Incheon, Gangwon, Daejeon/Chungcheong/Sejong, Gwangju/Jeolla/Jeju, and Busan/Daegu/Ulsan/Gyeongsang.

2) Enabling factors

Enabling factors included total income, employment status, health insurance type, and presence of actual loss insurance. Total income was based on the total annual household income of 12,395 adults among the total sample in KHPAD-2019 and was divided into the upper 1st quartile ($\geq$ 60 million won), 2nd quartile ($\geq$ 35.91 million won, < 60 million won), 3rd quartile ($\geq$ 17.88 million won, < 35.91 million won), and the 4th quartile (< 17.88 million won). Employment status was classified as "yes" if employed and "no" if not. Health insurance type was classified according to those who subscribed to employee or local health insurance and others (e.g., medical aid).

3) Need factors

The presence of disability, self-assessed health, and chronic disease type were identified as need factors. Subjective health status was classified as "good" for very good or good, "fair" for average, and "poor" for bad or very bad. Chronic diseases were classified by type: stomach cancer, colon cancer, lung cancer,
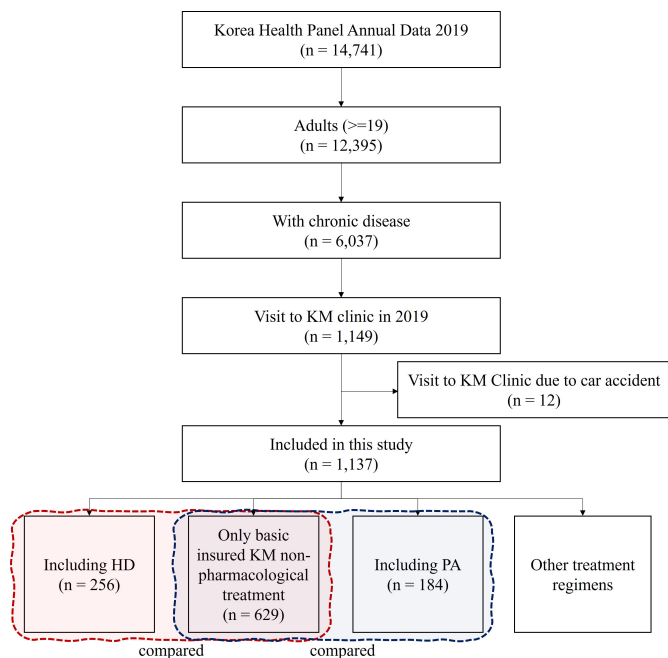

Figure 1. Subjects of this study. The basic treatment group is independent from the HD group or PA group. However, the HD group and PA group have 27 individuals in common. Only basic insured KM non-pharmacological treatments indicate acupuncture, moxibustion, and cupping. HD, herbal decoction; KM, Korean medicine; PA, pharmacopuncture.

breast cancer, cervical cancer, thyroid cancer, and other cancers were classified as "cancer;" hypertension, angina pectoris, myocardial infarction, cerebral hemorrhage, and cerebral infarction were classified as "cardiocerebrovascular diseases;" diabetes, hypothyroidism, and hyperthyroidism were classified as "endocrine diseases;" chronic hepatitis and alcoholic hepatitis were classified as "liver diseases;" knee arthrosis, degenerative arthritis of other joints, rheumatoid arthritis, intervertebral disc disorders, and other spinal diseases were classified as "musculoskeletal diseases;" asthma, emphysema, chronic obstructive pulmonary disease, and bronchiectasis were classified as "respiratory disease;" depression/bipolar disorder and dementia were classified as "neuropsychiatric disease;" and chronic renal failure was classified as "kidney disease."

4. Data analysis

We conducted a separate comparative analysis between the BT group and HD group and between the BT group and PA group. We made no comparison between the HD and PA groups because the BT group was the reference group. The BT, HD, or PA groups were independent, but the HD and PA groups were not independent (Fig. 1).

We analyzed the general characteristics of the groups using descriptive statistics. We investigated differences in characteristics between the groups using the chi-square test and t-test. Finally, we utilized binary logistic regression to analyze factors associated with HD or PA use compared to BT use. The specific analysis was based on the Anderson Model or Behavior Model of Service Utilization: Model 1 considered preceding factors, Model 2 considered preceding and enabling factors, and Model 3 considered all preceding, enabling, and need factors. The logistic regression analysis values were presented as an odds ratio (OR) and 95% confidence interval (CI). In this study, $p < 0.05$ was considered a statistically significant difference. Since this study did not involve the entire Korean population but analyzed a specific clinical subgroup, we did not apply a weight in the analysis of household member data. We used SPSS version 18.0 as a statistical program for data analysis.

5. Ethical consideration

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

RESULTS

1. General characteristics

The inclusion criteria were met by 55.32% (n = 629; BT group), 22.52% (n = 256; HD group), and 16.18% (PA group) of 1,137 adults with chronic diseases and outpatient KM service users. In the comparison between the BT group and the HD group, the HD group had significantly more women (p = 0.024), health insurance subscribers (p = 0.016), individuals who self-assessed their health as poor (p = 0.045), and individuals with musculoskeletal diseases (p = 0.008) compared to the BT group. In particular, the average number of chronic diseases observed in the HD group was 2.75 ± 1.44, significantly higher than the 2.52 ± 1.35 in the BT group (p = 0.024). However, compared to the BT group, the HD group had significantly fewer individuals in the fourth income quartile (p = 0.029) and with disabilities (p = 0.016).

In the comparison between the BT group and the PA group, the PA group had significantly more 30-49- year-old subjects (p = 0.014), subjects living in Gwangju/Jeolla/Jeju (p = 0.002), individuals in the 1st income quartile (p = 0.007), and health insurance subscribers (p = 0.000). In particular, the average income of the PA group was 41.4197 ± 34.2431 million won, which was significantly higher than the 31.1485 ± 29.8973 million won of the BT group (p = 0.000). However, compared to the BT group, the PA group had significantly fewer individuals over the age of 65 years (p = 0.032) and in the fourth income quartile (p = 0.000). The average age of the PA group was 63.99 ± 11.89 years, which was significantly younger than the 66.58 ± 10.98 years of the BT group (p = 0.006) (Table 2).

2. Factors associated with the use of non-insured KM services

1) HD

A logistic regression analysis showed statistically significant results for sex, including the preceding factors of the Anderson model (Model 1). However, this statistical significance disappeared in the analyses including preceding and enabling factors (Model 2) and all preceding, enabling, and need factors (Model 3). The statistical significances of total income and health insurance type observed in Model 2 continued in Model 3. According to the results of Model 3, compared to the fourth income quartile, the first quartile (OR, 2.06; p = 0.012), the sec-

Table 2. Differences in characteristics according to treatment group

Variables	Category	BT group (n = 629)	HD group (n = 256)	X² or t (p-value) Compared to BT group	PA group (n = 184)	X² or t (p-value) Compared to BT group
Age	19-29	1 (0.2%)	2 (0.8%)	2.085 (0.202)	0 (0%)	0.293 (1.000)
	30-49	50 (7.9%)	15 (5.9%)	1.168 (0.321)	26 **(14.1%)**	**6.419* (0.014)**
	50-64	184 (29.3%)	74 (28.9%)	0.011 (0.935)	59 (32.1%)	0.537 (0.465)
	65+	394 (62.6%)	165 (64.5%)	0.257 (0.645)	99 (53.8%)	**4.655* (0.032)**
	Mean age (yr)	66.58 ± 10.98	67.21 ± 10.63	-0.788 (0.431)	**63.99 ± 11.89**	**2.758** (0.006)**
Sex	Men	206 (32.8%)	**64 (25.0%)**	**5.155* (0.024)**	67 (36.4%)	0.856 (0.375)
	Women	426 (67.2%)	**192 (75.0%)**		117 (63.6%)	
Education level	Elementary school or below	244 (38.8%)	105 (41.0%)	0.377 (0.545)	65 (35.3%)	0.726 (0.437)
	Middle or high school	294 (46.7%)	117 (45.7%)	0.079 (0.824)	81 (44.0%)	0.424 (0.556)
	College above	91 (14.5%)	34 (13.3%)	0.211 (0.672)	38 (20.7%)	4.079 (0.051)
Region	Seoul/Gyeonggi/Incheon	181 (28.8%)	66 (25.8%)	0.811 (0.409)	55 (29.9%)	0.086 (0.782)
	Gangwon	26 (4.1%)	4 (1.6%)	3.673 (0.065)	2 (1.1%)	3.973 (0.062)
	Daejeon/Chungcheong/Sejong	135 (21.5%)	58 (%22.7)	0.152 (0.720)	36 (19.6%)	0.309 (0.609)
	Gwangju/Jeolla/Jeju	104 (16.5%)	52 (20.3%)	1.789 (0.206)	**50 (27.2%)**	**10.496** (0.002)**
	Busan/Daegu/Ulsan/Gyeongsang	183 (29.1%)	76 (29.7%)	0.031 (0.871)	41 (22.3%)	3.309 (0.075)
Total income	1st percentile	84 (13.4%)	39 (15.2%)	0.537 (0.455)	40 (21.7%)	**7.743** (0.007)**
	2nd percentile	106 (16.9%)	49 (19.1%)	0.660 (0.436)	42 (22.8%)	3.412 (0.082)
	3rd percentile	167 (26.6%)	78 (30.5%)	1.396 (0.247)	56 (30.4%)	1.079 (0.303)
	4th percentile	272 (43.2%)	**90 (35.2%)**	**4.923* (0.029)**	**46 (25.0%)**	**19.894*** (0.000)**
	Mean income	3114.85 ± 2989.73	3398.53 ± 2978.11	-1.281 (0.200)	**4141.97 ± 3424.31**	**-3.962*** (0.000)**
Employment status	Active	283 (45.0%)	107 (41.8%)	0.754 (0.412)	94 (51.1%)	2.126 (0.154)
	Non-active	346 (55.0%)	149 (58.2%)		90 (48.9%)	
Health insurance type	Employee or local	585 (93.0%)	**249 (97.3%)**	**6.083* (0.016)**	**183 (99.5%)**	**11.333*** (0.000)**
	Medical aid or others	44 (7.0%)	7 (2.7%)		1 (0.5%)	
Actual loss insurance	Have	392 (62.3%)	164 (64.1%)	0.236 (0.646)	126 (38.5%)	2.334 (0.139)
	Not have	237 (37.7%)	92 (35.9%)		58 (31.5%)	
Disability	Presence	79 (12.6%)	**19 (7.4%)**	**4.877* (0.033)**	16 (8.7%)	2.060 (0.191)
	Absence	550 (87.4%)	**237 (92.6%)**		168 (91.3%)	
Self-assessed health	Good	158 (25.1%)	54 (21.1%)	1.619 (0.224)	35 (19.0%)	2.924 (0.094)
	Fair	289 (45.9%)	111 (43.4%)	0.491 (0.503)	88 (47.8%)	0.202 (0.675)
	Poor	180 (28.6%)	**91 (35.5%)**	**4.113* (0.045)**	61 (33.2%)	1.404 (0.235)

Table 2. Continued

Variables	Category	BT group (n = 629)	X² or t (p-value) Compared to BT group	HD group (n = 256)	X² or t (p-value) Compared to BT group	PA group (n = 184)	X² or t (p-value) Compared to BT group
Chronic disease	Total number of chronic disease	2.52 ± 1.35		2.75 ± 1.44	-2.263* (0.024)	2.58 ± 1.49	-0.573 (0.567)
Cancer	Presence	70 (11.1%)		20 (7.8%)	2.190 (0.177)	19 (10.3%)	0.094 (0.893)
	Absence	559 (88.9%)		236 (92.2%)		165 (89.7%)	
Cardio-cerebrovascular	Presence	378 (60.1%)		168 (65.6%)	2.354 (0.128)	101 (54.9%)	1.593 (0.233)
	Absence	251 (39.9%)		88 (34.4%)		83 (45.1%)	
Endocrine	Presence	179 (28.5%)		66 (25.8%)	0.651 (0.456)	56 (30.4%)	0.271 (0.644)
	Absence	450 (71.5%)		190 (74.2%)		128 (69.6%)	
Liver	Presence	10 (1.6%)		3 (1.2%)	0.220 (0.767)	6 (3.3%)	2.060 (0.222)
	Absence	619 (98.4%)		253 (98.8%)		178 (96.7%)	
Musculoskeletal	Presence	354 (56.3%)		169 (66.0%)	7.135** (0.008)	118 (64.1%)	3.603 (0.062)
	Absence	275 (43.7%)		87 (34.0%)		66 (35.9%)	
Respiratory	Presence	26 (4.1%)		7 (2.7%)	0.992 (0.434)	8 (4.3%)	0.016 (0.837)
	Absence	603 (95.9%)		249 (97.3%)		176 (95.7%)	
Neuropsychiatric	Presence	35 (5.6%)		24 (9.4%)	4.246 (0.052)	12 (6.5%)	0.240 (0.594)
	Absence	594 (94.4%)		232 (90.6%)		172 (93.5%)	
Renal	Presence	1 (0.2%)		2 (0.8%)	2.085 (0.202)	0 (0%)	0.293 (1.000)
	Absence	628 (99.8%)		254 (99.2%)		184 (100%)	

*p < 0.05; **p < 0.01; ***p < 0.001.
BT, basic insured Korean medicine non-pharmacological treatment; HD, herbal decoction; PA, pharmacopuncture.

Table 3. Factors associated with the use of herbal decoction

Independent variables		Model 1			Model 2			Model 3		
		OR	95% LLCI	95% ULCI	OR	95% LLCI	95% ULCI	OR	95% LLCI	95% ULCI
Predisposing factors										
Age (ref: 65+)	19-29	4.68	0.39	55.54	5.06	0.40	64.32	4.03	0.30	54.12
	30-49	0.67	0.33	1.35	0.55	0.26	1.16	0.64	0.29	1.38
	50-64	0.94	0.67	1.33	0.84	0.57	1.23	0.99	0.66	1.49
Sex	Women	1.46*	1.03	2.06	1.44	0.99	2.08	1.24	0.85	1.83
Education level (ref: college above)	Elementary school or below	0.88	0.50	1.55	1.13	0.62	2.06	0.97	0.52	1.81
	Middle or high school	0.91	0.54	1.53	1.00	0.58	1.71	0.94	0.54	1.64
Region (ref: Seoul/Gyeonggi/Incheon)	Gangwon	0.44	0.15	1.31	0.40	0.13	1.21	0.41	0.13	1.24
	Daejeon/Chungcheong/Sejong	1.18	0.77	1.80	1.14	0.75	1.75	1.17	0.76	1.81
	Gwangju/Jeolla/Jeju	1.41	0.91	2.20	1.45	0.92	2.27	1.41	0.89	2.24
	Busan/Daegu/Ulsan/Gyeongsang	1.12	0.76	1.66	1.09	0.73	1.62	1.07	0.71	1.60
Enabling factors										
Total income (ref: 4th percentile)	1st percentile	-	-	-	1.84*	1.06	3.19	2.06*	1.17	3.62
	2nd percentile	-	-	-	1.67*	1.05	2.65	1.64*	1.02	2.65
	3rd percentile	-	-	-	1.46	1.00	2.13	1.50*	1.02	2.22
Employment status	Active	-	-	-	0.86	0.62	1.19	0.91	0.65	1.27
Health insurance type (ref: medical aid or others)	Employee or local	-	-	-	2.35*	1.01	5.47	2.51*	1.04	6.02
Actual loss insurance	Have	-	-	-	1.05	0.74	1.50	1.07	0.74	1.54
Need factors										
Disability	Presence	-	-	-	-	-	-	0.55*	0.32	0.96
Self-assessed health (ref: poor)	Good	-	-	-	-	-	-	0.70	0.45	1.09
	Fair	-	-	-	-	-	-	0.80	0.55	1.15
Cancer	Presence	-	-	-	-	-	-	0.78	0.45	1.36
Cardio-cerebrovascular	Presence	-	-	-	-	-	-	1.46*	1.03	2.07
Endocrine	Presence	-	-	-	-	-	-	0.95	0.67	1.35
Liver	Presence	-	-	-	-	-	-	0.92	0.24	3.57
Musculoskeletal	Presence	-	-	-	-	-	-	1.66**	1.15	2.40
Respiratory	Presence	-	-	-	-	-	-	0.70	0.29	1.67
Neuropsychiatric	Presence	-	-	-	-	-	-	1.97*	1.09	3.56
Renal	Presence	-	-	-	-	-	-	3.97	0.33	47.47

*p < 0.05; **p < 0.01; ***p < 0.001.
LLCI, lower limit confidence interval; OR, odds ratio; ULCI, Upper limit confidence interval.

Table 4. Factors associated with the use of pharmacopuncture

Independent variables		Model 1			Model 2			Model 3		
		OR	95% LLCI	95% ULCI	OR	95% LLCI	95% ULCI	OR	95% LLCI	95% ULCI
Predisposing factors										
Age (ref: 65+)	19-29	0.00	0.00	NA	0.00	0.00	NA	0.00	0.00	NA
	30-49	1.78	0.95	3.34	1.48	0.75	2.92	1.37	0.66	2.83
	50-64	1.34	0.90	1.99	1.17	0.75	1.81	1.25	0.79	1.97
Sex	Women	0.87	0.61	1.26	0.88	0.59	1.31	0.81	0.54	1.23
Education level (ref: college above)	Elementary school or below	0.93	0.51	1.68	1.38	0.72	2.63	1.00	0.51	1.97
	Middle or high school	0.86	0.51	1.44	1.04	0.60	1.80	0.87	0.49	1.54
Region (ref: Seoul/Gyeonggi/Incheon)	Gangwon	0.25	0.06	1.11	0.23	0.05	1.01	0.24	0.05	1.07
	Daejeon/Chungcheong/Sejong	0.89	0.55	1.44	0.85	0.52	1.40	0.89	0.54	1.47
	Gwangju/Jeolla/Jeju	1.61*	1.02	2.54	1.71*	1.07	2.75	1.68*	1.03	2.74
	Busan/Daegu/Ulsan/Gyeongsang	0.78	0.49	1.24	0.74	0.46	1.19	0.73	0.45	1.17
Enabling factors										
Total income (ref: 4th percentile)	1st percentile	-	-	-	2.61**	1.42	4.79	2.83**	1.51	5.29
	2nd percentile	-	-	-	2.09**	1.22	3.58	2.19**	1.26	3.82
	3rd percentile	-	-	-	1.95**	1.23	3.09	2.03**	1.26	3.26
Employment status	Active	-	-	-	0.91	0.63	1.33	1.00	0.68	1.47
Health insurance type (ref: medical aid or others)	Employee or local	-	-	-	11.79*	1.57	88.37	13.43*	1.77	101.91
Actual loss insurance	Have	-	-	-	0.93	0.61	1.41	0.97	0.63	1.49
Need factors										
Disability	Presence	-	-	-	-	-	-	0.73	0.40	1.35
Self-assessed health (ref: poor)	Good	-	-	-	-	-	-	0.62	0.36	1.06
	Fair	-	-	-	-	-	-	0.80	0.52	1.24
Cancer	Presence	-	-	-	-	-	-	0.94	0.52	1.69
Cardio-cerebrovascular	Presence	-	-	-	-	-	-	1.09	0.74	1.62
Endocrine	Presence	-	-	-	-	-	-	1.21	0.83	1.79
Liver	Presence	-	-	-	-	-	-	2.42	0.79	7.48
Musculoskeletal	Presence	-	-	-	-	-	-	1.91**	1.25	2.92
Respiratory	Presence	-	-	-	-	-	-	1.22	0.52	2.88
Neuropsychiatric	Presence	-	-	-	-	-	-	1.61	0.76	3.40
Renal	Presence	-	-	-	-	-	-	0.00	0.00	NA

*p < 0.05; **p < 0.01; ***p < 0.001.
LLCI, lower limit confidence interval; NA, not applicable; OR, odds ratio; ULCI, Upper limit confidence interval.

ond quartile (OR, 1.64; p = 0.041), and the third quartile (OR, 1.50; p = 0.041) showed a significant positive association with the use of HD. Compared to medical aid, being a health insurance subscriber (OR, 2.51; p = 0.040) also showed a significant positive association with HD use. Regarding health conditions, the presence of disability (OR, 0.55; p = 0.036) was significantly negatively associated with HD use, but the presence of cardiovascular disease (OR, 1.46; p = 0.034), musculoskeletal disease (OR, 1.66; p = 0.007), and neuropsychiatric disorders (OR, 1.97; p = 0.025) were significantly positively associated with HD use (Table 3).

2) PA

According to the logistic regression analysis, statistically significant variables in the residential region observed in Model 1 also showed significant results in Models 2 and 3. The statistical significances of total income and health insurance type observed in Model 2 continued in Model 3. According to the results of Model 3, compared to residents of Seoul/Gyeonggi/Incheon, residents of Gwangju/Jeolla/Jeju (OR, 1.68; p = 0.039) showed a significant positive association with PA use. Compared to the fourth income quartile, the first quartile (OR, 2.83; p = 0.001), the second quartile (OR, 2.19; p = 0.006), and the third quartile (OR, 2.03; p = 0.003) showed a significant posi-

tive association with PA use. Compared to medical aid, being a health insurance subscriber (OR, 13.43; p = 0.012) also showed a significant positive association with PA use. Regarding health conditions, musculoskeletal disorders (OR, 1.91; p = 0.003) were significantly positively associated with PA use (Table 4).

DISCUSSION

The BT group comprised 55.32%, the HD group comprised 22.52%, and the PA group comprised 16.18% of adults with chronic diseases who used outpatient KM services. Compared to the BT group, the HD group had significantly more women, health insurance subscribers, individuals with poor self-assessed health, and individuals with musculoskeletal disorders and average chronic diseases. It had significantly fewer individuals in the fourth income quartile and with disabilities. In the logistic regression analysis, in the first, second, and third income quartiles compared to the fourth quartile, health insurance subscribers compared to those receiving medical aid and the presence of cardiovascular disease, musculoskeletal disease, and neuropsychiatric disease were significantly positively associated with HD use. However, the presence of disability showed a significant negative association.

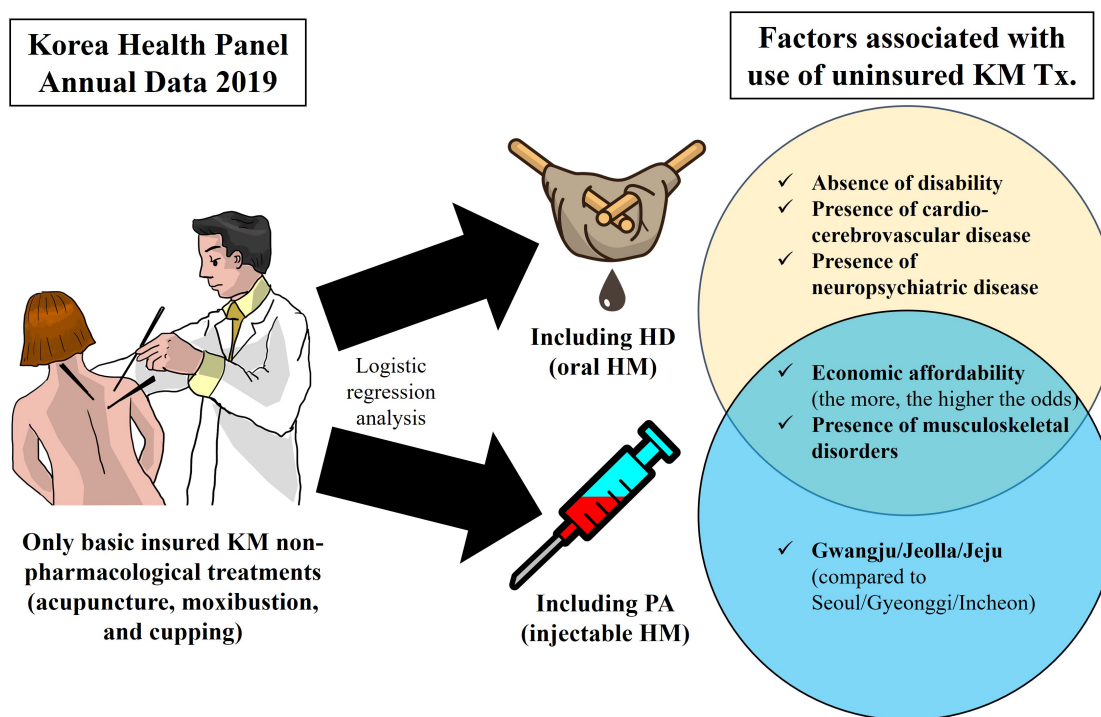Compared to the BT group, the PA group was significantly

Figure 2. Summary of the findings. HD, herbal decoction; HM, herbal medicine; KM, Korean medicine; PA, pharmacopuncture; Tx, treatment.

more likely to live in Gwangju/Jeolla/Jeju, be in the first income quartile, have health insurance, and have a significantly higher income. The PA group was significantly less likely to be over 65 years of age and in the fourth income quartile, however. In the logistic regression analysis, as in the case of HD, the first, second, and third income quartiles compared to the fourth quartile and health insurance subscribers compared to those who receive medical aid showed a significant positive association with PA use. Moreover, Gwangju/Jeolla/Jeju residents (compared to Seoul/Gyeonggi/Incheon residents) and the presence of musculoskeletal diseases were significantly positively associated with PA use (Fig. 2).

This study was based on the KHPAD-2019 dataset, and there were 6,037 adults with chronic diseases included in this panel. Among these, there were 1,149 (19.03%) annual KM outpatient users, indicating frequent KM use in this group. After excluding patients who visited KM clinics due to car accidents, there were 1,137 subjects (18.83%). In terms of individual KM treatment, among adults with chronic diseases in South Korea, 10.42% (629/6,037) received BT of acupuncture, moxibustion, or cupping, 4.24% (256/6,037) received HD, and 3.05% received PA (184/6,037).

Economic factors were commonly associated with the use of HD or PA compared to the use of BT alone. Specifically, for both HD or PA use, being in the first, second, and third income quartiles was significantly associated with the use of non-insured KM treatments compared to those in the fourth income quartile, and their OR values also increased proportionally with income level. Moreover, both HD and PA use were significantly associated with being a health insurance subscriber compared to those utilizing medical aids. Since the medical aid system of South Korea does not support non-insured KM treatments, such as HD and PA, their use was limited among individuals with low economic levels. Economic vulnerability hinders the use of non-insured treatments, which imposes a financial burden [14]. This suggests possible health disparities in KM treatment options for individuals with chronic diseases.

Meanwhile, poor health status was associated with the use of HD or PA, and the use of both non-insured KM treatments was significantly associated with musculoskeletal disorders. Musculoskeletal conditions constitute a major associated factor in the use of KM services. The general population recognizes that KM treatments may be effective against musculoskeletal disorders [12], and the presence of musculoskeletal conditions is associated with more HD or PA use than the use of BT alone.

This suggests that perceptions of these non-insured KM treatments for musculoskeletal conditions are likely more favorable. This observation can be understood in the context of high-quality studies demonstrating the therapeutic effects of HD [15] or PA [16, 17] for musculoskeletal diseases recently published in South Korea. Some clinical practice guidelines recommend their use for chronic low back pain, lumbar disc herniation, and degenerative knee arthritis [18].

A study analyzing KHPAD data between 2015 and 2018 showed that pain is closely related to economic burden and can lead to catastrophic medical expenses [19]. The study also found that high pain intensity correlated with significantly lower annual household incomes (no pain: 33.5 million won; painful: 24 million won; and severe pain: 18.8 million won; p < 0.001) [19]. Chronic musculoskeletal disorders are often associated with pain conditions, and the results of the current study highlight a demand for HD or PA to treat musculoskeletal diseases in individuals with chronic diseases. However, the economic burden may inhibit their use, suggesting possible unmet medical needs.

In addition to musculoskeletal diseases, HD was also significantly associated with the presence of cardiovascular and neuropsychiatric diseases, suggesting a broader range of expected effects as perceived by patients for HD compared to PA. For example, many clinical trials support the therapeutic benefits of HD for major cardiovascular diseases, such as stroke [20] and heart failure [21], and major neuropsychiatric diseases, such as depression [22] and dementia [23]. Research on PA focuses on musculoskeletal diseases and obesity [24]. However, clinical trials of PA for non-musculoskeletal diseases, such as Parkinson's disease [25] and insomnia [26], are underway in South Korea. According to a survey of KM doctors, PA is used for musculoskeletal diseases and for neurological and gastrointestinal diseases [27]. Furthermore, this treatment is recommended in the KM clinical practice guidelines for various diseases, such as breast cancer, chronic fatigue, cold hands and feet, dementia, dizziness, menstrual pain, facial nerve paralysis, functional dyspepsia, and Hwa-byung disease [18]. Therefore, the expectations regarding the therapeutic effects of PA and its use patterns in patients with chronic diseases may change in the future.

This study found statistical associations between the use of non-insured KM treatments (i.e., HD and PA) and region of residence. Some previous studies have reported a relationship between KM service use and residential areas. A study of the KHPAD dataset found that KM service use was significantly

more frequent among individuals living in small and medium-sized cities compared to metropolitan areas [11]. In a study targeting individuals aged 19-39 years, region of residence was significantly related to willingness to recommend KM services to others [28]. We found that among residents of Busan/Daegu/Ulsan/Gyeongsang compared to Seoul/Gyeonggi/Incheon, a significant negative relationship with the use of KM services in patients with mood disorders [29]. However, there is insufficient research on the differential use of KM by region, especially the use of non-insured KM treatments, to derive meaningful interpretations. As described, the use of non-insured treatments in individuals with chronic diseases suggests a direction for policy revision of public health insurance coverage [8]. Given the regional imbalance in chronic disease management in South Korea [30], this topic warrants further research.

This study has several limitations. First, this study is a secondary data source analysis using KHPAD-2019 data. IT may not have included and investigated some important variables for analyzing factors related to the use of non-insured KM treatment, such as subjects' perceptions of HD or PA. Therefore, this analysis did not consider perceived treatment benefits or economic burdens of receiving non-insured KM treatments. These study findings could have been influenced by factors not investigated in KHPAD-2019. Second, this study investigated factors related to HD or PA use through regression analysis, but it could not confirm causality due to its cross-sectional design. Third, this study investigated HD or PA use in terms of the Anderson Model or Behavior Model of Service Utilization. However, the use of non-insured KM treatments in clinical settings will be influenced by individual factors and clinicians' experiences and recommendations. However, the potential influence of clinicians was omitted in this study due to the limitations of the KHPAD-2019 dataset.

CONCLUSION

This study used KHPAD-2019 data to investigate the use of non-insured KM treatments among adults with chronic diseases. The presence of some chronic diseases, especially musculoskeletal diseases, was significantly positively associated with HD and PA use. Low economic status was significantly negatively associated with HD and PA use, indicating potential unmet medical needs in this population. Since chronic diseases impose a significant health burden, these study results can serve as a reference for future health insurance coverage policies in South Korea.

AUTHORS' CONTRIBUTIONS

Conceptualization: Chan-Young Kwon. Methodology: Chan-Young Kwon, Sunghun Yun, Bo-Hyoung Jang, Il-Su Park. Investigation: Chan-Young Kwon, Sunghun Yun, Bo-Hyoung Jang, Il-Su Park. Project administration: Chan-Young Kwon. Funding acquisition: Chan-Young Kwon. Supervision: Il-Su Park. Writing – Original draft: Chan-Young Kwon, Sunghun Yun, Bo-Hyoung Jang, Il-Su Park. Writing – Review & Editing: Chan-Young Kwon, Sunghun Yun, Bo-Hyoung Jang, Il-Su Park.

CONFLICTS OF INTEREST

Chan-Young Kwon has been an editorial board member of Journal of Pharmacopuncture since 2022 but has no role in the decision to publish this article. No other potential conflicts of interest relevant to this aricle were reported.

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