Research article

Risk factors of passive suicidal ideation among outpatients in traditional medicine clinics: The case of Korean medicine in South Korea

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A R T I C L E I N F O

A B S T R A C T

Suicide is the leading cause of death worldwide, especially in South Korea. Individuals using Korean medicine (KM) clinics are common in this country, but KM doctor is not yet used in the country's suicide prevention policy. In this study, we investigated the prevalence and risk factors of passive suicidal ideation (SI) among outpatients at KM clinics, and attempted to develop a predictive model of SI through multivariate analysis. The Korea Health Panel Annual Data 2019, a nationally representative survey in South Korea, was analyzed. In this study, 1924 (weighted n:5,958,666) people aged 19 or older who used the KM outpatient service at least once in 2019 were set as study subjects. The authors calculated the weighted prevalence of passive SI and identified significant sociodemographic, physical, and mental factors using the Rao-Scott chi-square test and weighted logistic regression. A suicide risk scorecard was developed using the point to double the odds method to quantify individual risk, resulting in a score range of 0–100. We found high prevalence of passive SI among KM outpatients (7.5 %), and the annual prevalence of passive SI tended to be higher with increasing age (4.6 % in young adults, 6.7 % in middle-aged, and 12.4 % in old age). Also, the prevalence increased as stress worsened (2.0 % in hardly, 3.9 % in a little, 13.7 % in a lot, and 24.8 % in very much). By using multiple logistic regression analysis, SI risk prediction score model was developed, including basic livelihood security recipients, presence of chronic diseases, perceived stress, depression, and low quality of life. According to our findings, passive SI is not uncommon among KM outpatients. Based on current findings, the potential role of KMDs in the country's suicide prevention strategy can be discussed focusing on specific groups such as socioeconomically vulnerable groups, the elderly population, and those with physical illnesses.

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1. Introduction

South Korea has maintained the highest suicide rate among the Organization for Economic Cooperation and Development countries since 2018 [1]. Accordingly, the Korean government has made efforts to reduce the suicide rate, such as restricting availability of lethal suicide methods and deleting dangerous postings found online [2]. However, South Korea still has a high suicide rate, and as of 2020, the death rate per 100,000 population was reported to be 24.1 [1]. Therefore, reducing the risk of suicide in this country is an urgent mental health issue, and the country's suicide prevention policy emphasizes the use of the primary care settings [3].

Because many people who attempt suicide visit primary care physicians—who are medical doctors providing initial and ongoing care before referring patients to specialists—before their attempt, the potential role of them in suicide prevention is important [4]. The dualized medical system maintained in South Korea allows licensed Korean medicine doctors (KMDs), who are practitioners specialized in Korean medical (KM) treatments, including acupuncture, for health promotion [5]. In South Korea, KMDs generally serve as primary care physicians, and according to a nationwide cross-sectional survey, 74.1 % of the general population in South Korea had received KM treatment [6]. According to the results of a survey of KMDs, 47.0 % of respondents had contact with patients with SI in a clinical setting during the past year, and 59.2 % were willing to participate in a national suicide prevention policy [7]. However, the potential role of KMD in the context of primary care's contribution to suicide prevention has not yet been investigated.

Investigating the prevalence and related factors of SI in patients visiting medical settings is important for optimizing suicide risk screening in clinical settings. Especially, the importance of effective primary care-based screening for suicide risk has been emphasized [4]. For suicide prevention strategies, including suicide risk assessment, to become part of routine practice workflow in primary care, preventing staff burnout and prioritizing workforce wellness should be prioritized [8,9]. Additionally, some studies have argued that universal suicide risk assessment in primary care settings will not substantially help reduce suicide risk [10]. According to our survey, KMDs had a low level of agreement that suicide risk is routinely assessed in general KM clinics (mean 3.45 points on a Likert scale of 1–5), and most of them (61.6 %) responded that suicide risk should be assessed in potentially at-risk patients [7]. In this context, developing a tool that can quickly identify patients at risk of suicide based on the characteristics of patients visiting a KM clinic can be considered of public health significance. In addition, since most patients who visit the KM clinic are primarily concerned with pain conditions rather than mental health conditions [11], developing a SI prediction model in this population may contribute to identifying high-risk patients who require additional psychiatric interviews. The development of such a model can be useful in cases where patients cannot clearly express their condition, and in combination with in-person screening [12], it can contribute to optimizing the evaluation.

Therefore, to our knowledge, this study is the first to investigate the prevalence and risk factors of passive SI among outpatients at KM clinics. Additionally, the authors aimed to develop a predictive model of passive SI using multivariate analysis to better understand and identify the factors contributing to passive SI in this population.

2. Methods

2.1. Data source

In this study, the Korea Health Panel Annual Data 2019 (KHPAD-2019), which is second-period data from the Korea Health Panel Survey conducted in 2020 by the Korea Institute for Health and Social Affairs and the National Health Insurance Service, was used. To ensure changes in Korea's demographic structure and representativeness of the Korean population, the KHPAD-2019 sets the 2016 register-based census as its sampling frame, and surveys were collected from groups sampled according to a two-step stratified clustering sampling method (i.e., 1st stratification by city and 2nd stratification by sub-administrative districts). KHPAD-2019 investigators visit target households and conduct a survey on household members using the Computer Assisted Personal Interviewing. This panel is a nationally representative and aims to provide a comprehensive and in-depth analysis of factors related to healthcare utilization among Koreans, making it appropriate for investigating individuals visiting KM clinics [13], which serve as a pillar of public health in this country [5].

2.2. Identification of passive suicidal ideation

In KHPAD-2019, the existence of passive SI was determined as a yes or no answer to the following questions: "*Have you ever thought about wanting to die in the past year?*" Those who answered "yes" to this question were classified as having passive SI, and those who answered "no" were classified as having no passive SI. Passive SI has been considered an important marker of suicidal behavior in clinical settings [14]. Importantly, a recent meta-analysis found a statistically non-significant difference in effect estimates between passive SI and active SI for suicidal attempts [15]. Detecting passive SI with a single question has been used not only in KHPAD-2019 but also in other population-based surveys [16,17]. However, the limitations of single question evaluation of SI, such as validity and consequences of misclassification, are still recognized [18].

2.3. Study subjects

The inclusion criteria for this study were as follows: (1) individuals aged 19 or older, and (2) individuals who used KM outpatient service at least once in 2019. To derive generalized results for the target population, the entire Korean population, a complex sample

analysis that reflects complex sample design factors such as stratification variables and weights should be conducted. KHPAD-2019, which was constructed using the two-step stratified clustering sampling method, provides weights for each household and household member to reflect the stratification variables and weights. By using the household member weights, the results from household members residing in the 17 stratified cities in this panel can be generalized. In this study, 1924 (weighted n = 5,958,666) individuals met the inclusion criteria and were included in the analysis. In this study, 1924 (weighted n = 5,958,666) individuals out of 14,741 (weighted n = 51,709,098) in KHPAD-2019 met the inclusion criteria and were included in the analysis.

2.4. Data analysis

The authors calculated the weighted prevalence of passive SI rate according to sociodemographic, physical, and mental characteristics using the Rao-Scott chi-square test to determine differences in passive SI rates. Significant factors related to passive SI were identified using weighted multiple logistic regression to calculate odds ratio (OR). Based on these results, a suicide risk scorecard was developed to quantify the risk of passive SI. To create the scorecard, the point to double the odds (PDO) method was used [19–21], which standardizes the scores on a scale of 0–100. The PDO was set to 4.08, meaning that every increase of 4.08 points doubles the odds of passive SI. The adjusted regression coefficient for each factor was calculated using the following steps.

(1) Step 1. Adjusted Regression Coefficient: This step normalizes the regression coefficients by subtracting the smallest coefficient. This ensures all coefficients are positive and comparable.
 - Adjusted regression coefficient = Regression coefficient – Smallest regression coefficient
(2) Step 2. Passive SI Risk Score: This equation converts the adjusted coefficients into a risk score using the PDO. The risk score reflects the relative importance of each factor in predicting passive SI.
 - Passive SI risk score = Adjusted regression coefficient × [PDO/log(2)]

The total risk score for passive SI is calculated by summing the scores for each significant factor. This scorecard provides a quantifiable measure of risk based on multiple factors, aiding in the identification of individuals at higher risk for passive SI. The methodology of this study is summarized in Fig. 1, and the operational definitions of the analysis variables, including the dependent and independent variables, are as Supplement 1.

2.5. Ethical consideration

The study was conducted according to the Declaration of Helsinki and approved by the Institutional Review Board of Dongeui
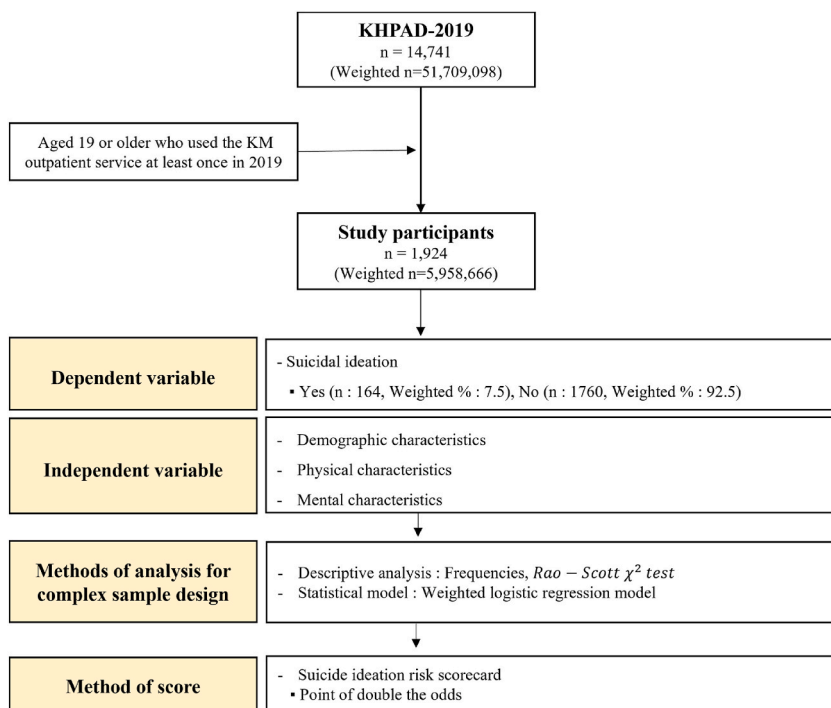

Fig. 1. Flow chart of this study.
Abbreviations. KHPAD-2019, the Korea Health Panel Annual Data 2019; KM, Korean medicine.

University Korean Medicine Hospital (IRB No. DH-2023-03; approved on June 14, 2023). Personal identifiers were removed, and data were encrypted and stored securely. Informed consent was obtained, and only de-identified data were analyzed.

3. Results

3.1. Participant characteristics

In the total sample, the proportion of women was 62.2 %. Middle-aged adults (i.e., 40–64 years old) accounted for about half (51.3 %), and young adults (i.e., 19–39 years old) and older adults (i.e.,≥65 years old) accounted for a quarter each. Most of the participants were living with their spouses and participating in economic activities. Annual household income was evenly distributed among the four quartiles. Among the participants, very few were eligible for basic livelihood security recipients (i.e., 4.0 %), but most of them were aware of the burden on their households for health expenditures (Table 1).

3.2. The annual prevalence of SI and related factors

In the total sample, the annual prevalence of passive SI was 7.46 % (n = 164). Notably, the annual prevalence of passive SI tended to be higher with increasing age (4.6 % in young adults, 6.7 % in middle-aged, and 12.4 % in old age). Moreover, the participants' annual prevalence of passive SI was significantly higher in those who did not live with a spouse ($p < 0.001$), were not economically active ($p = .004$), had low annual income ($p < 0.001$), were basic livelihood security recipients, ($p < 0.001$) or were on burden on households of health expenditures ($p = .007$) (Table 1). According to the results of comparing the differences in the presence of passive SI according to physical characteristics, the participants' annual prevalence of passive SI was significantly higher in those with chronic disease ($p < 0.001$) and being bedridden ($p < 0.001$). Among the types of chronic diseases, those significantly positively associated with the presence of passive SI were hypertension ($p = .001$), joint disease ($p < 0.001$), and depression/bipolar disorder ($p < 0.001$). In addition, significant differences in the presence of passive SI were observed depending on subjective health status ($p < 0.001$), with the prevalence increasing as subjective health status worsened (4.4 % in good, 6.3 % in normal, and 18.0 % in bad) (Supplement 2). All mental and quality of life (QOL) variables examined for association with the presence of passive SI showed statistical significance. That is, the participants' annual prevalence of passive SI was significantly higher in those with anxiety/worry ($p < 0.001$), depression ($p < 0.001$), use of medications for mental health problem ($p < 0.001$), and above average of QOL ($p < 0.001$). In addition, significant differences in the presence of passive SI were observed depending on perceived stress ($p < 0.001$), with the prevalence increasing as stress worsened (2.0 % in hardly, 3.9 % in a little, 13.7 % in a lot, and 24.8 % in very much) (Supplement 3).

3.3. The suicide risk scorecard

Factors that had a statistically significant effect on the presence of passive SI among the characteristics of the study subjects and weighted multiple logistic regression were used to identify the factors that affect passive SI and their degree of influence, and a suicide risk scorecard for KM outpatients was developed. As described, the suicide risk scorecard was calculated based on the ORs of the

Table 1
Suicidal ideation according to the demographic characteristics.

Characteristics	Categories	Weighted % (n = 1924)	Presence of suicidal ideation			
			n (Weighted %)		Rao -Scott χ^2	p
			Yes (n = 164)	No (n = 1760)		
Sex	Men	37.8	41(5.6)	604(94.4)	3.278	0.070
	Women	62.2	123(8.6)	1156(91.4)		
Age group	Young adults	25.6	17(4.6)	260(95.4)	12.658	0.002
	Middle-aged	51.3	52(6.7)	795(93.3)		
	Old age	23.2	95(12.4)	705(87.6)		
Education level	High school graduation or less	53.4	133(8.9)	1196(91.1)	3.324	0.068
	Junior college graduation or higher	46.6	31(5.8)	564(94.2)		
Living with a spouse	No	28.1	62(12.0)	433(88.0)	12.573	<0.001
	Yes	71.9	102(5.7)	1327(94.3)		
Economic activity	No	38.0	97(10.4)	773(89.6)	8.548	0.004
	Yes	62.0	67(5.7)	987(94.3)		
Annual household income	Higher 4th quartile	25.0	94(13.6)	604(86.4)	22.350	<0.001
	Higher 3rd quartile	24.9	34(7.7)	458(92.3)		
	Higher 2nd quartile	25.0	25(5.6)	390(94.4)		
	Higher 1st quartile	25.1	11(2.9)	308(97.1)		
Basic livelihood security recipients	No	96.1	145(6.8)	1687(93.2)	21.746	<0.001
	Yes	4.0	19(24.1)	73(75.9)		
Burden on households of health expenditures	No	32.6	30(4.5)	501(95.5)	7.206	0.007
	Yes	67.5	134(8.9)	1259(91.1)		

weighted multiple logistic regression. Individual suicide risk can be presented by comprehensively considering various risk factors. According to the scorecard, the suicide risk score of the individual with the highest passive SI was 100 points, indicating that the state was at the highest risk level for each category of passive SI-related factors (Table 2, Fig. 2, Supplement 4).

4. Discussion

4.1. Main findings

According to our findings, the annual prevalence of passive SI in outpatients of KM clinics was 7.5 % (males: 5.6 %, females: 8.6 %), which was slightly higher than the prevalence of passive SI (total: 7.1 %, males: 6.0 %, females: 8.1 %) in the entire sample of KHPAD-2019. Importantly, the annual prevalence of passive SI tended to be higher with increasing age (4.6 % in young adults, 6.7 % in middle-aged, and 12.4 % in old age), and with worsened stress (2.0 % in hardly, 3.9 % in a little, 13.7 % in a lot, and 24.8 % in very much). A passive SI risk prediction scorecard was developed by using multiple logistic regression analysis. This scorecard consists of the following five items and predicts the presence of passive SI in KM outpatients with a score of 0–100: basic livelihood security recipient, presence of chronic diseases, perceived stress, depression, and QOL index.

4.2. Implications for public health

Individuals using KM services are common in South Korea [6]; however, given that KMDs are not yet included in the country's suicide prevention policy, it is important for public health to identify and manage suicide risks in these patients at an early stage. Suicidal behaviors, including SI, can be caused by multiple clinical and non-clinical risk factors [22], making multiple logistic regression analysis an appropriate analytical method for this study.

Our study found that the annual prevalence of passive SI in outpatients of KM clinics was slightly greater than in the entire sample of KHPAD-2019 (7.5 % vs. 7.1 %). Additionally, the prevalence of passive SI among KM outpatients in this study was higher than that reported in the Korea National Health and Nutrition Examination Survey (7.5 % vs. 5.1 %), another nationally representative Korean panel [23]. Previous research has shown that patients visiting KM clinics in South Korea primarily suffer from musculoskeletal disorders and are often elderly and/or female [24]. In a representative Korean sample, musculoskeletal and connective tissue diseases have been associated with more frequent SI in primary care settings (OR:1.93) [25]. Given that pain [26,27] and older age [23,28] are well-documented risk factors for SI, our findings are consistent with these previous studies. Furthermore, the observed gender differences in SI prevalence (5.6 % vs. 8.6 %) align with existing literature suggesting that women are more likely to report SI than men, possibly due to higher rates of depression and stress among women [29].

Among the variables related to the presence of SI in KM outpatients, basic livelihood security recipients were found to have a decisive effect through a weighted multiple logistic regression. In South Korea, the National Basic Livelihood Security Program has been implemented since 2000 and provides living expenses, medical expenses, educational support, and housing arrangements for low-income people [30]. Therefore, basic livelihood security recipients can be considered as a socioeconomically vulnerable group, and the high suicide rate in this group has been highlighted in the context of South Korea [31]. Unlike other countries, where health insurance for complementary and integrative medicine (CIM) therapies is not applied [32], in South Korea, when some CIM therapies, including acupuncture, are implemented by the KMDs, they are covered by national health insurance [5], so the barrier to service

Table 2
Suicide risk scorecard of Korean medicine outpatients using weighted logistic regression model.

Parameter	β	OR (95 % CI)	Score
Intercept	−5.507	–	–
Basic livelihood security recipients			
Yes	1.036	2.817(1.109–7.155)	14.038
No (Ref)	0	1.000	0.000
Presence of chronic disease			
Yes	1.204	3.334(1.745–6.370)	16.322
No (Ref)	0	1.000	0.000
Perceived stress			
Very much	1.792	5.999(1.611–22.336)	24.284
A lot	1.549	4.707(1.619–13.686)	20.997
A little	0.724	2.062(0.743–5.723)	9.813
Hardly (Ref)	0	1.000	0.000
Depression (sadness/unhappiness)			
Yes	2.533	12.587(7.055–22.457)	34.331
No (Ref)	0	1.000	0.000
QOL index (EQ-5D)			
Below average	0.813	2.255(1.148–4.432)	11.025
Above average (Ref)	0	1.000	
Model Fit Statistics			
C-Statistic	0.826		

Abbreviations. CI, confidence interval; OR, odds ratio; QOL, quality of life.
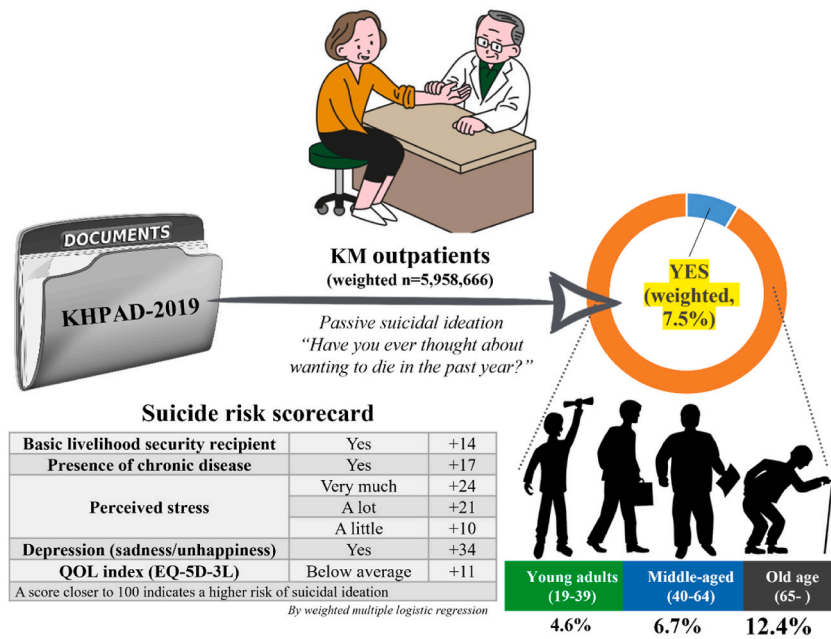
Fig. 2. Development of the suicide risk scorecard in this study.
Abbreviations. KHPAD-2019, the Korea Health Panel Annual Data 2019; KM, Korean medicine.

examinations is relatively low. This is particularly notable for KM clinics rather than KM hospitals, and a recent national cross-sectional study found that income level did not significantly affect KM clinic use in South Korea [33]. Moreover, given the invigoration of KM home care services for vulnerable populations since the COVID-19 pandemic [34], the potential role of KMDs in reducing suicide rates in South Korea may include early screening, management, and/or referral of SI in this vulnerable population. In other words, considering the inclusion of KMDs in Korea's suicide prevention strategy might be worth discussing, especially in the context of enhancing the management of socioeconomically vulnerable groups.

Moreover, some medical conditions including chronic diseases, perceived stress, and depression, were significantly associated with the presence of passive SI in KM outpatients. A study examining the perceptions of patients with chronic diseases regarding the efficacy of KM treatment showed highly positive perceptions about back pain, disc-related diseases, facial nerve palsy, and digestive diseases [35]. Given that many patients visiting KM clinics have musculoskeletal disorders [24], the potential contribution of KMDs to the high suicide rate in South Korea may be related to the management of patients with chronic musculoskeletal disorders. Also, given the potential risk of SI in conditions associated with chronic pain, including chronic musculoskeletal disorders, the use of simple, high-precision screening questions is clinically important for detecting undetected suicide risk in patients [36]. Our previous study found that the proportion of South Korean patients visiting KM clinics to manage psychiatric risk factors for suicide, such as perceived stress and depression, is small [37]. However, because these psychiatric risk factors are also common and important in chronic musculoskeletal pain conditions [38], KMDs need to carefully detect the presence of SI potentially associated with chronic pain, even in patients without predominant psychiatric symptoms. However, according to our survey of KMDs, 82.0 % of respondents do not use suicide risk assessment tools in their clinical settings [7]. This suggests that specialized education on suicide risk assessment and the distribution of related tools to KMDs could be helpful in the early detection of suicide risk, particularly in patients with physical disabilities such as chronic pain. Physical illness may be a clue to SI, which is underdiagnosed, especially in vulnerable populations such as the elderly [39]. Therefore, considering involving KMDs in Korea's suicide prevention strategy may contribute to uncovering hidden SI in specific populations, such as elderly patients with chronic pain.

A significant risk factor identified in the regression analysis included low QOL. A recent study indicated that low QOL was associated with suicide risk, especially among middle-aged Koreans aged 40–64 years [23]. However, even in Korean individuals over 65 years of age, low QOL was significantly associated with a high risk of SI [40]. It has been reported that KM services, especially KM home care services for vulnerable groups, can help improve their QOL [34]. Although QOL is an important factor related to passive SI in KM outpatients and can be considered an outcome related to KM treatment, it has not been routinely assessed or studied in KM clinical settings in South Korea. Considering the importance of QOL assessment in adults with chronic diseases [41] and the participation of KMDs in suicide prevention policies in South Korea, the use and interpretation of appropriate QOL assessment tools in KM clinical settings is important.

Finally, considering the use of KMDs in a national suicide prevention strategy could be integrated within the context of Korea's existing mental health service system. For example, the recently developed Seoul-type community-based mental healthcare model presents an integrated and comprehensive community-based mental health care framework consisting of five stages [42]. The first step is "requesting and selecting subjects" [42], where patients with SI among those visiting KM clinics can be referred to psychiatric

institutions. Additionally, in steps 2 and 3 of this model, both mental and physical health management plans are established and managed [42]. Given that KMDs provide holistic treatment based on the close connection between an individual's mind and body [43], they can be efficiently integrated into this comprehensive care plan. Moreover, evidence-based modalities [44,45] proven to alleviate SI could be incorporated into the clinical practice of KMDs.

4.3. Limitations of this study

This study has the following limitations. First, although the KHPAD-2019 is a nationally representative sample, the total number of subjects analyzed in this study was only 1924, so some factors may not have been assigned a sufficient number of samples to evaluate their potential impact. In this study, a complex sample analysis was conducted to supplement these potential limitations and derive generalized analysis results. Second, this study targeted individuals who had received KM outpatient services at least once in the past year. However, given the frequent use of KM services in home care settings [34] or the public sector [46] and their potential importance in the context of suicide prevention, the potential role of KMDs, which was not addressed in this study, should be further investigated using other accredited research databases or surveys. Third, the accuracy of the method for evaluating passive SI in the KHPAD-2019 may not be adequate. This survey assessed the presence of passive SI using one question: "*Have you ever thought about wanting to die in the past year?*" Passive SI evaluated using this method may have a lower detection accuracy than other verified SI evaluation tools. Additionally, compared to this study investigating passive SI, it is possible that the prevalence of SI may be lower in studies investigating active SI in KM clinics. Finally, the currently developed suicide risk scorecard is rudimentary, and appropriate questions or assessment tools for detailed factors must be established in the context of suicide risk screening. In addition, the accuracy of prospectively developed suicide risk scorecards in clinical settings needs to be evaluated in comparison with standardized tools such as the Beck Scale for Suicide Ideation and the Columbia Suicide Severity Rating Scale [47].

5. Conclusions

Among KM outpatients, the prevalence of passive SI was 7.5 %, which was slightly higher than the prevalence of passive SI (7.1 %) in the entire sample of KHPAD-2019. The factors significantly related to the presence of passive SI through a weighted multiple logistic regression were as follows: basic livelihood security recipients, presence of chronic diseases, perceived stress, depression, and low QOL. The results of this study can be used to estimate the potential impact and to identify challenges if KMDs, which have not yet been used in policy despite the high suicide rate in South Korea, are used in suicide prevention policies. Based on the factors discovered in this study, the potential role of KMDs in the country's suicide prevention strategy can be discussed focusing on specific groups such as socioeconomically vulnerable groups, the elderly population, and those with physical illnesses. At the same time, discussions could be initiated for early screening of potentially at-risk populations in the clinical practice of KMD, including the use of the scorecard developed in this study.

Ethics statement

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Institutional Review Board of Dongeui University Korean Medicine Hospital (IRB No. DH-2023-03; approved on June 14, 2023).

Funding

Data availability

The data will be made available upon request.

CRediT authorship contribution statement

Ilsu Park: Writing – original draft, Methodology, Conceptualization. **Tae-Hyeon Lee:** Writing – review & editing. **Chan-Young Kwon:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e37181.

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