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Health literacy and attitudes toward complementary and alternative medicine (CAM) among patients with urolithiasis

Burcak Sahin Koze^{1*}, Pinar Ongun², Muhammed Sacid Demir³ and Sakir Ongun³

Abstract

Background The use of complementary and alternative medicine (CAM) is common among patients with chronic and recurrent conditions, including urinary system stones. Understanding the relationship between patients' attitudes toward CAM and their level of health literacy is essential for promoting informed and safe use of complementary therapies.

Methods This descriptive study was conducted at the Urology Clinic of Balıkesir University Hospital and included 202 patients who underwent surgery for urolithiasis. Data were collected using a structured questionnaire, the Holistic Complementary and Alternative Medicine Attitude Scale (HCAMAS), and the Health Literacy Scale (HLS). Descriptive statistics, Pearson correlation analysis, and Classification and Regression Tree (CART) analysis were performed.

Results The mean age of the participants was 49.48 ± 13.37 years, and 64.3% reported using CAM, with medicinal waters being the most frequently preferred method (70.63%). Participants demonstrated moderate levels of both CAM attitudes (HCAMAS: 32.69 ± 5.29) and health literacy (HLS: 32.60 ± 8.68). Correlation analyses indicated very weak but statistically significant inverse associations between CAM attitudes and the critical and interactive dimensions of health literacy, as well as between the CAM subdimension and critical health literacy. CART analysis identified educational level as the strongest determinant of both health literacy and CAM attitudes.

Conclusion Although no overall association was observed between CAM attitudes and health literacy, the high prevalence of CAM use underscores the need for targeted patient education regarding complementary therapies. Strengthening health literacy through tailored educational interventions may promote informed decision-making and support the safe integration of CAM with conventional medical care.

Keywords Urologic surgical procedures, Urolithiasis, Patients, Complementary therapies, Health literacy

*Correspondence:

Burcak Sahin Koze

burcak.sahin.koze@ege.edu.tr; burcaksahinkoze@gmail.com

¹Faculty of Nursing, Department of Surgical Diseases Nursing, Ege University, İzmir 35100, Türkiye

²Faculty of Health Sciences, Department of Nursing, Balıkesir University, Balıkesir 10145, Türkiye

³Faculty of Medicine, Department of Urology, Balıkesir University, Balıkesir 10145, Türkiye



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Introduction

Urinary stones are crystalline aggregates that can develop in any part of the renal tract, and their presence within the urinary system is referred to as urolithiasis [1, 2]. The history of urolithiasis dates back to ancient civilizations, with paleopathological evidence suggesting its existence as early as 7,000 years ago [3]. Today, urinary stone disease remains a significant global health concern, affecting individuals across various age groups [1, 4]. Epidemiological studies indicate that the prevalence of kidney stones is higher in men than in women [5, 6]. Recurrence is a major concern in kidney stone disease. The likelihood of recurrence is influenced by a patient's stone history, with an annual recurrence rate of approximately 6% among first-time stone formers, which increases to as high as 15% in individuals with a prior history of recurrent stones [7]. This trend underscores the need for effective preventive strategies, particularly for patients who have experienced multiple stone episodes. Since urinary stones may grow large or become lodged within the urinary system, many patients seek non-surgical alternatives to conventional interventions, including dietary modifications and pharmacological treatments [8].

Given the challenges associated with strict dietary adherence, concerns over the side effects of conventional medications, and the accessibility of alternative treatments, many kidney stone patients turn to complementary and alternative medicine (CAM) to manage their symptoms or reduce the risk of recurrence [8, 9]. However, despite the widespread use of CAM, the scientific evidence supporting the efficacy and safety of these treatments remains limited [8, 10]. A systematic review of pharmacological and alternative therapies for kidney stone prevention highlights a notable lack of well-designed, high-quality clinical trials, emphasizing the urgent need for further investigation [11].

Patients with urolithiasis represent a particularly relevant population for investigating CAM use because the disease is chronic, recurrent, and strongly influenced by lifestyle and self-management behaviors. Long-term prevention strategies often rely on patients' independent health decisions, making them more likely to seek complementary therapies alongside conventional treatment. In this context, patients' ability to understand, evaluate, and appropriately use health information becomes especially important.

Health literacy significantly influences individuals' capacity to evaluate treatment options, comprehend medical information, and make informed healthcare decisions. Despite its importance, the relationship between patients' attitudes toward CAM and their level of health literacy among individuals with urolithiasis remains largely unexplored. Addressing this gap may help improve patient education strategies,

support evidence-based decision-making, and promote the safe use of complementary therapies. Therefore, this study aims to examine the relationship between attitudes toward complementary and alternative medicine and health literacy among patients with urinary system stones.

Methods

Study aim, design, setting, and duration

This study aims to investigate the association between health literacy and attitudes toward alternative medicine in patients with urinary stones, contributing to a more informed approach to patient care and medical decision-making. This descriptive study was carried out at the Urology Clinic of Balikesir University Health Application and Research Hospital from April 3, 2023, to March 1, 2024.

Population and sample

The study population consisted of patients hospitalized in the Urology Clinic of Balikesir University Health Practice and Research Hospital. The study sample included 202 patients who underwent urolithiasis surgery. The effect size between the health literacy scores of university graduates and individuals with a primary school education or lower was found to be 0.618. As a result of the post hoc power analysis based on the effect size, the critical t-value was 1.65, degrees of freedom was 201, and the statistical power was 1.00 [7]. Patients aged 18 and over, diagnosed with urolithiasis, without any psychiatric diagnosis, and willing to participate were included in this study.

Data collection

The data were collected face-to-face using the "Data collection form" created by the researchers based on the literature and the "Holistic Complementary and Alternative Medicine Attitude Scale (HCAMAS)" and "Health Literacy Scale (HLS)".

The data collection form; developed based on the literature, consisted of 15 questions assessing demographic characteristics, chronic illnesses, use of complementary and alternative medicine (CAM) for urinary system stones, reasons for CAM use, and specific CAM methods used [9, 12, 13].

The HCAMAS was developed by Hyland et al. (2003) and its Turkish validity and reliability study was conducted by Erci (2007) [14, 15]. This 11-item Likert-type scale assesses attitudes towards holistic complementary and alternative medicine. It consists of two subscales: the Holistic Health subscale (items 1, 3, 5, 7, 10), which measures the perception of individual involvement in self-care, and the Complementary and Alternative Medicine subscale (items 2, 4, 6, 8, 9, 11), which assesses attitudes towards the use of complementary and alternative

treatments. Higher scores indicate a more negative attitude towards CAM. The Cronbach's alpha reliability coefficient for the scale was 0.72.

The Health Literacy Scale was developed by Suka et al. (2013) to assess adults' health literacy levels in Japan [16]. This 14-item scale includes three subscales: Functional Health Literacy (items 1–5), Interactive Health Literacy (items 6–10), and Critical Health Literacy (items 11–14). Higher total scores indicate better health literacy. The Turkish validity and reliability study of the scale was conducted by Türkoğlu and Kılıç (2021), reporting a Cronbach's alpha coefficient of 0.85, indicating high reliability [17]. In this study, the Cronbach's alpha value was found to be 0.86.

Statistical analysis

The data obtained from the study were analyzed using IBM SPSS Statistics 25 (IBM SPSS – Statistical Package for the Social Sciences for Windows). The results were evaluated at a 95% confidence interval, with a significant level of $p < 0.05$. Descriptive statistical methods, including frequency and percentage distributions, were used for data analysis. Additionally, an independent samples t-test and one-way ANOVA were conducted. Pearson correlation analysis was performed to assess the relationships between the scales, and Classification and Regression Tree (CART) analysis was applied to identify the factors influencing the scales.

Ethical considerations

Ethical approval was obtained from Balıkesir University Health Sciences Non-Interventional Scientific Research Ethics Committee (Approval Date: 07.03.2023, Approval Number: 2023/25), and institutional permission was granted by the hospital where the study was conducted. Additionally, permission was obtained from the authors of the scales used in the study. The study was conducted in accordance with the principles of the Declaration of Helsinki. Written and verbal consent was obtained from the patients for the face-to-face administration of the data collection form.

Results

The mean age of the patients participating in the study is 49.48 ± 13.37 . The distribution of patients' sociodemographic characteristics and disease information is presented in Table 1.

When patients were asked about their use of CAM for urinary system stones, 64.9% reported that they used these methods. The reasons for resorting to CAM among the patients were, respectively, belief in its healing/beneficial effects (77.78%), worsening of their symptoms (e.g., pain, fatigue, weakness, nausea) (46.03%), and the desire to enhance the effectiveness of their current

medical treatment (36.51%). The most frequently used CAM methods were healing waters (70.63%), herbal approaches (e.g., nettle, kirkkilit, and gilaburu) (57.14%), and nutritional approaches (e.g., honey, mulberry molasses, parsley, and olive oil) (28.57%) (Table 2).

The mean total score of the HCAMAS was 32.69 ± 5.29 , where lower scores indicate a more positive attitude toward complementary and alternative medicine. The findings suggest that patients' attitudes toward complementary and alternative medicine were at a moderate level. Among the sub-dimensions, the highest mean score was observed in the CAM sub-dimension (22.82 ± 4.14). The mean score for the Holistic Health sub-dimension was 9.87 ± 4.10 .

The mean total score of the HLS was 32.60 ± 8.68 , with higher scores indicating greater health literacy. The findings suggest that the overall health literacy level of the patients in this study was moderate. Among the sub-dimensions, the highest mean score was observed in the Functional Health Literacy sub-dimension (15.55 ± 5.81). The mean scores for the remaining sub-dimensions were 9.84 ± 4.44 for Interactive Health Literacy and 7.20 ± 3.88 for Critical Health Literacy, respectively.

The relationship between the HCAMAS and HLS scales and their subdimensions was evaluated using Pearson correlation analysis. A statistically significant weak negative correlation was found between the HCAMAS scale and the Critical and the Interactive subdimension of the HLS scale ($p = 0.012$; $p = 0.019$). A statistically significant very weak negative correlation was observed between the HCAMAS scale and the critical and interactive subdimensions of the HLS scale ($p = 0.015$) (Table 3).

The patients' sociodemographic characteristics and disease information were compared with the scales and subdimensions. A statistically significant relationship was found between educational status and Functional SOY, with this difference attributable to patients with a university degree ($p: 0.000$). Additionally, a statistically significant relationship was observed between occupation and Functional HLS, with the difference being attributable to those working as civil servants ($p < 0.001$). A statistically significant relationship was also found between chronic disease and Functional HLS ($p = 0.032$) (Table 4). Moreover, a statistically significant relationship was observed between monthly income and HCAMAS, with the difference attributable to patients whose income was equal to their expenses ($p < 0.001$) (Table 4).

As shown in Fig. 1, CART analysis identified education level as the main determinant of health literacy. Participants with a secondary school education or lower had lower health literacy scores, whereas those with higher education levels demonstrated better scores. Among individuals with lower education levels, the presence of a chronic disease further reduced health literacy scores.

Table 1 Distribution of patients' sociodemographic characteristics and disease information

		Mean $\pm$ SD
Age		49.48 $\pm$ 13.37
	n	%
Gender		
Female	67	33.2
Male	135	66.8
Marital Status		
Married	172	85.1
Single	30	14.9
Educational Status		
Elementary School and Below	87	43.1
Middle School	34	16.8
High School	44	21.8
University	37	18.3
Income Status		
Income Less Than Expenses	85	42.1
Income Equal to Expenses	97	48.0
Income Greater Than Expenses	20	9.9
Occupation		
Housewife	52	25.7
Worker	55	27.2
Civil Servant	13	6.4
Retired	42	20.8
Farmer	15	7.4
Other	25	12.4
Chronic Disease		
Yes	97	48.0
No	105	52.0
Regular Medication Use		
Yes	93	46.0
No	109	54.0
Family History of Stone Disease		
Yes	68	43.3
No	89	56.7
Does Stone Disease Cause Loss of Work Capacity?		
Yes	84	41.6
No	118	58.4
Total	202	100

SD Standard Deviation

In other words, participants with both lower education levels and chronic diseases showed the lowest health literacy levels. These findings highlight the need for targeted interventions to improve health literacy, particularly among patients with limited education and chronic health conditions.

As illustrated in Fig. 2, education level was also identified as the primary determinant of HCAMAS scores. Individuals with a middle school education or lower had lower HCAMAS scores compared with those with higher education levels. Among participants with lower education levels, CAM use for urinary system stones emerged as an additional influencing factor, with CAM users showing lower scores than non-users. Among individuals

with higher education levels, income status was identified as a secondary determinant, with higher-income participants demonstrating higher HCAMAS scores. These results suggest that educational and socioeconomic factors play an important role in shaping attitudes toward CAM.

Discussion

This study examined the relationship between attitudes toward complementary and alternative medicine (CAM) and health literacy among patients with urinary system stones. The findings indicated that patients demonstrated moderate levels of both CAM attitudes and health literacy. In addition, very weak but statistically significant

Table 2 Use of complementary and alternative medicine

	n	%
Do you use complementary and alternative medicine methods for urinary stones?		
Yes	126	62.40
No	76	37.60
What is your reason for resorting to complementary and alternative medicine methods?*		
Because I believe in its healing/beneficial effects	98	77.78
Because my symptoms worsen (e.g., pain, fatigue, weakness, nausea)	58	46.03
To enhance the effectiveness of the current medical treatment	46	36.51
Because my condition relapsed	33	26.19
To boost my immune system	19	15.08
Because it is cheaper than medication	8	6.35
Which complementary and alternative medicine method do you use for urinary stones?*		
Medicinal waters	89	70.63
Herbal approaches	72	57.14
Nutritional approaches	36	28.57
Diets	10	7.94
Vitamins and Minerals	9	7.14
Other	8	6.35
Spiritual approach (Meditation, Acupuncture)	3	2.38
Religious approach (prayer, supplication, amulet)	3	2.38

*Multiple responses were allowed

Table 3 Correlation between scales and their subdimensions

Scale		Health Literacy Scale	Functional HL	Interactive HL	Critical HL
HCAMAS	r	-.132	.005	-.165*	-.177*
	p	.014	.946	.019	.012
Holistic Health Subdimension	r	-.076	.021	-.123	-.098
	p	.283	.763	.080	.165
CAM Subdimension	r	-.123	-.021	-.115	-.171*
	p	.082	.765	.102	.015

r Pearson Correlation

p < 0.05, Correlated factors are indicated in bold

associations were observed between certain dimensions of CAM attitudes and health literacy. These results suggest that although health literacy may influence attitudes toward CAM to some extent, the relationship between these variables appears to be limited in this patient population. Nevertheless, patients' health-seeking behaviors and their ability to interpret health information may still play an important role in shaping treatment preferences and decision-making processes [18, 19].

Previous studies have identified various reasons for seeking CAM, including recommendations, desperation, family beliefs, unmet needs, attempting all possible options, faith in its benefits, family or friends' suggestions, and belief in its effectiveness [20–24]. In this study, patients primarily used CAM due to their perceived

healing effects, increased symptom burden (such as pain and fatigue), and the desire to enhance the efficacy of conventional medical treatments. These findings indicate that patients actively seek alternative approaches to manage their health conditions and frequently integrate CAM alongside standard medical care. However, the effectiveness and safety of these alternative therapies remain largely unverified, underscoring the need for robust scientific evidence to guide clinical recommendations and ensure patient safety.

The most commonly used CAM method among patients with urinary system stones was medicinal waters (74.2%). Increasing water intake is one of the most effective strategies for preventing stone recurrence [8]. Patients in this study commonly consumed geothermal water rich in sodium bicarbonate, a practice believed to have been passed down through generations [25]. The second most preferred CAM method was herbal approaches, including nettle, horsetail, and gilaburu (59.4%). The anti-urolithic effects of herbal treatments have been well-documented [26, 27]. Studies suggest that herbal supplements may be effective in treating kidney stones, offering cost-effective alternatives with potential benefits for both patients and the healthcare system [28, 29]. The third most frequently used CAM method was nutritional approaches, including honey, black mulberry molasses, parsley, and olive oil (31.6%). Parsley has been found to maintain urine pH at levels that prevent calcium oxalate crystal aggregation, facilitating their elimination [27]. Similarly, olive oil has been recognized for its protective effects against urinary system stones [30]. These findings indicate that both traditional knowledge and individual experiences influence patients' choices of CAM methods. Given the potential risks of unregulated CAM use, it is crucial for healthcare professionals to provide accurate information and guidance to ensure patient safety.

In this study, the mean HCAMAS score was 33.26 ± 5.14 , indicating a moderate attitude towards CAM. Previous studies reported different HCAMAS scores: Şensoy et al. (2020) found an average score of 29.52 ± 5.70 [24], Öztürk et al. (2016) reported 29.61 ± 4.85 [12], Şahin et al. (2019) found 28.46 ± 5.04 [31], Erci (2007) reported 58.0 ± 4.01 [14], and Aktaş (2017) found 31.38 ± 4.40 [32]. The differences in these findings may be attributed to variations in study populations, which included patients and their relatives, cancer patients, nursing students, and healthy individuals.

The mean total score for health literacy was 32.02 ± 9.15 , indicating a moderate level of health literacy. Among the sub-dimensions, the highest score was observed in Functional Health Literacy (15.99 ± 5.80). Analysis of relationships between the scales revealed very weak but statistically significant positive correlation

Table 4 Comparison of patients’ sociodemographic characteristics and disease information with the scales

	Health Literacy Scale			Functional HL			Interactive HL			Critical HL			HCAMAS			Holistic Health Subdimension			CAM Subdimension		
	Mean	SD		Mean	SD		Mean	SD		Mean	SD		Mean	SD		Mean	SD		Mean	SD	
Gender																					
Female	30.38	9.84		14.78	5.53		8.64	4.19		6.96	4.01		32.68	5.26		9.62	3.31		23.06	4.33	
Male	32.79	8.75		16.56	5.86		9.43	4.50		6.79	3.87		33.53	5.08		10.93	4.57		22.59	3.79	
	p:0.150			p:0.088			p:0.433			p:0.816			p:0.255			p:0.052			p:0.642		
Marital Status																					
Married	31.73	8.94		15.83	5.84		9.05	4.25		6.84	3.86		33.28	5.06		10.51	4.24		22.77	4.01	
Single	34.00	10.50		17.10	5.54		10.05	5.38		6.85	4.29		33.10	5.77		10.55	4.39		22.55	3.74	
	p:0.303			p:0.363			p:0.349			p:0.997			p:0.881			p:0.970			p:0.815		
Educational Status																					
Elementary School and Below	30.10	7.89		13.90	5.18		9.15	3.39		7.04	3.56		32.70	5.815		10.39	4.59		22.3030	4.32	
Middle School	30.96	8.70		16.07	4.90		8.42	4.42		6.46	3.56		32.07	3.114		10.35	3.03		21.7143	2.95	
High School	33.74	9.98		16.34	5.88		9.88	5.52		7.51	4.78		34.09	4.705		10.85	3.87		23.2286	4.04	
University	35.46	10.31		20.39	5.60		9.14	5.03		5.92	3.79		34.75	5.317		10.53	5.01		24.2143	3.53	
	p:0.034			p:0.000			p:0.752			p:0.106			p:0.024			p:0.846			p:0.010		
				d>a,b,c																	
Income Status																					
Income Less Than Expenses	31.11	7.13		15.60	5.75		8.72	3.70		6.79	3.83		32.43	4.85		10.27	4.05		22.14	3.63	
Income Equal to Expenses	32.63	10.22		15.97	5.70		9.65	4.89		7.00	3.99		34.42	5.30		10.97	4.48		23.45	4.32	
Income Greater Than Expenses	33.12	11.59		17.75	6.51		9.00	4.91		6.37	4.03		31.50	4.61		9.43	3.88		22.06	3.27	
	p:0.547			p:0.415			p:0.448			p:0.838			p:0.098			p:0.315			p:0.404		
Occupation																					
Housewife	29.62	9.32		14.42	5.46		8.45	3.99		6.75	4.03		32.47	5.65		9.62	3.50		22.85	4.77	
Worker	32.80	9.65		16.02	5.53		9.71	4.66		7.06	3.99		33.95	4.95		11.31	5.21		22.64	3.41	
Civil Servant	35.77	3.70		22.77	3.63		8.88	4.13		4.11	.33		33.88	3.72		10.66	2.12		23.22	3.41	
Retired	31.05	9.93		13.97	5.13		9.62	4.92		7.45	4.12		33.75	5.48		10.89	4.68		22.86	3.89	
Farmer	32.33	3.39		18.41	6.73		7.91	2.90		6.00	3.04		29.83	3.04		9.00	2.21		20.83	3.18	
Other	36.28	9.23		19.28	4.84		9.71	4.69		7.28	4.28		34.50	4.58		10.71	3.51		23.78	4.29	
	p:0.152			p:0.000			p:0.653			p:0.286			p:0.134			p:0.396			p:0.560		
Chronic Disease																					
Yes	31.55	8.69		14.59	5.96		9.65	4.33		7.29	3.96		32.97	5.44		10.46	4.04		22.51	4.13	
No	33.52	8.61		16.43	5.57		10.00	4.57		7.08	3.82		32.49	5.14		9.34	4.12		23.14	4.15	
	p:0.108			p:0.025			p:0.579			p:0.700			p:0.513			p:0.054			p:0.284		

Table 4 (continued)

	Health Literacy Scale		Functional HL		Interactive HL		Critical HL		HCAMAS		Holistic Health Subdimension		CAM Subdimension	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Regular Medication Use														
Yes	32.21	10.06	15.37	5.85	9.51	4.85	7.31	4.12	33.37	5.18	10.63	3.93	22.73	4.32
No	31.83	8.17	16.61	5.72	8.84	3.90	6.37	3.64	33.15	5.12	10.39	4.56	22.75	3.60
	p: 0.795		p:0.183		p:0.341		p:0.130		p:0.796		p:0.730		p:0.972	
	t:0.261		t:−1.337		t:0.955		t:1.521		t:0.259		t:0.346		t:−0.035	
Do you use complementary and alternative medicine methods for urinary stones?														
Yes	32.65	8.46	15.70	5.96	9.61	4.39	7.32	3.97	31.96	5.21	9.69	3.82	22.26	4.20
No	32.53	9.07	15.31	5.58	10.21	4.52	7.01	3.75	33.90	5.22	10.17	4.53	23.73	3.89
	p:0.930		p:0.645		p:0.361		p:0.581		p:0.011		p:0.422		p:0.014	
	t:0.088		t:0.462		t:−0.916		t:0.552		t:−2.569		t:−0.805		t:−2.468	

SD Standard Deviation, F One Way ANOVA, t independent samples t-test
p<0.05, Correlated factors are indicated in bold

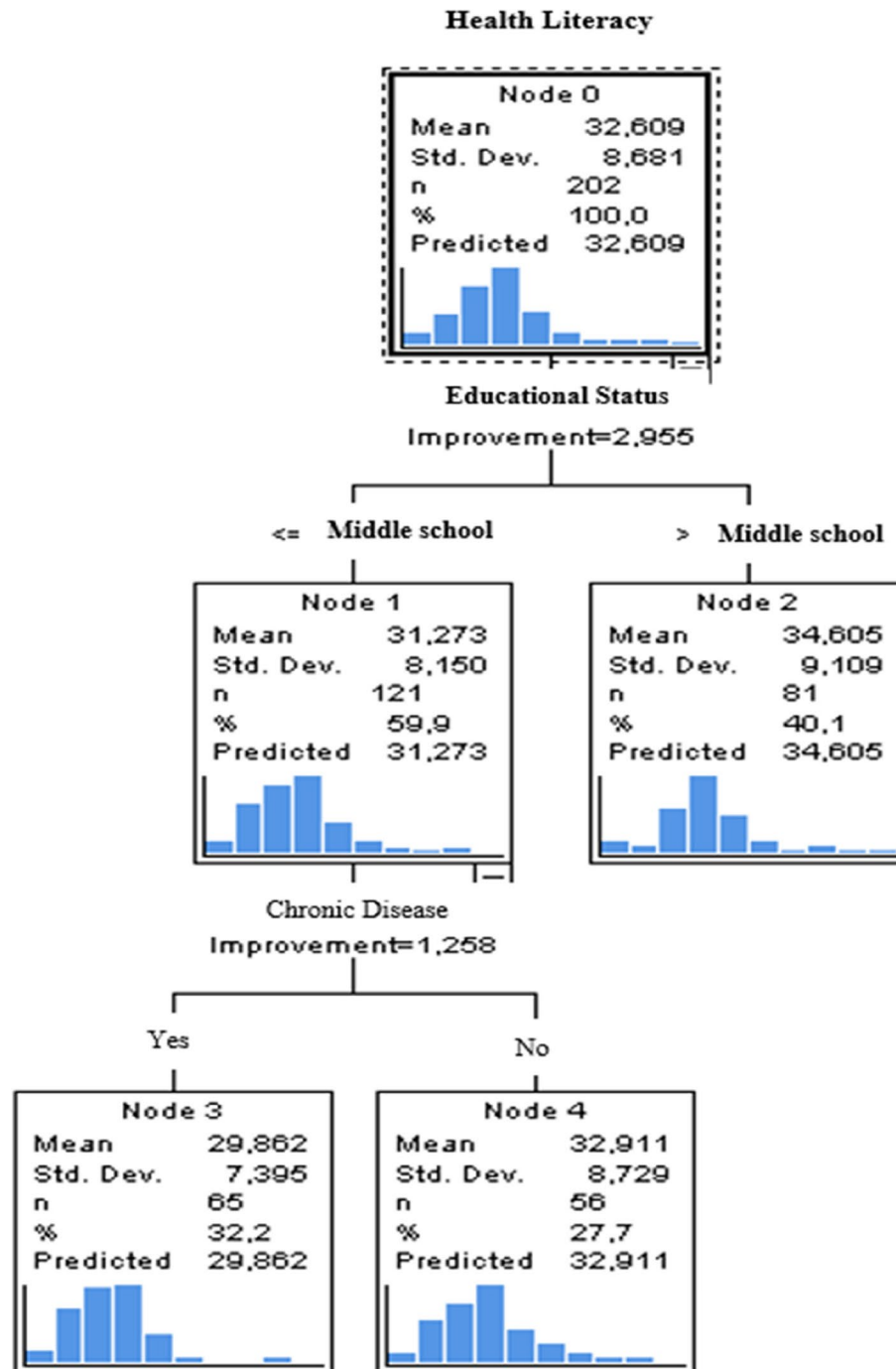


Fig. 1 The classification and regression tree analysis of health literacy

between the Holistic sub-dimension of HCAMAS and the Critical Health Literacy sub-dimension. University graduates, civil servants, and patients with chronic diseases showed significant differences in Functional Health Literacy scores. Developing targeted education programs and individualized approaches to enhance health literacy is crucial for improving health outcomes, especially among at-risk populations.

Although the exact reasons behind the increasing interest in CAM remain unclear, its growing popularity is evident. This study found that patients who had previously used CAM had significantly higher HCAMAS scores. Identifying patients' prior CAM use may help in understanding their interests and preventing potentially harmful or incorrect treatment choices.

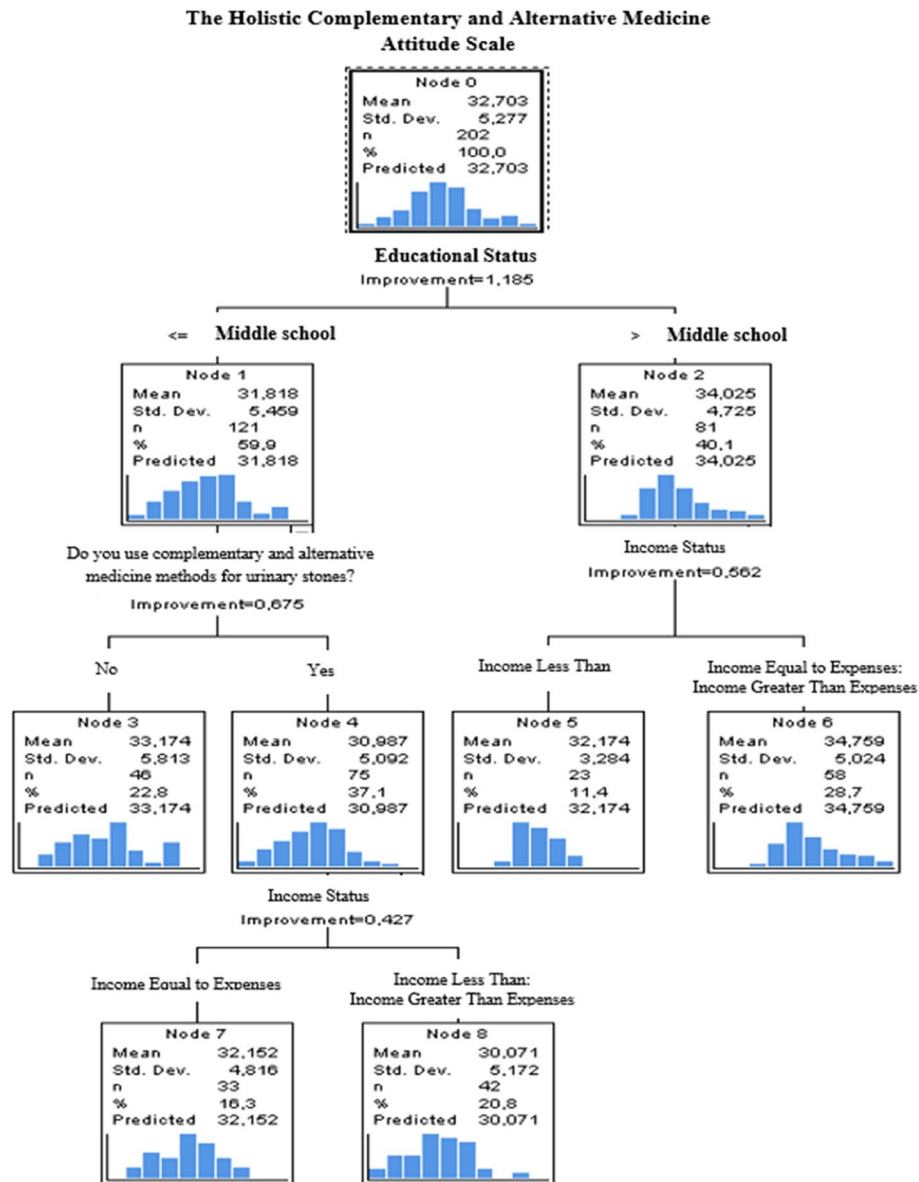


Fig. 2 The classification and regression tree analysis of the holistic complementary and alternative medicine attitude scale

Conclusion and recommendations

Patients with urinary system stones demonstrated moderate levels of both attitudes toward complementary and alternative medicine and health literacy. Although no overall association was identified, educational level emerged as an important determinant influencing both health literacy and CAM attitudes.

Given the widespread use of complementary therapies, targeted educational interventions and evidence-based patient information are needed to support informed decision-making and ensure the safe use of CAM alongside conventional treatment. Future randomized controlled studies are warranted to further evaluate the role of complementary therapies in clinical care.

Abbreviations

CAM	Complementary and Alternative Medicine
HCAMAS	Holistic Complementary and Alternative Medicine Attitude Scale
HLS	Health Literacy Scale

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12906-026-05372-9>.

Supplementary Material 1.

Supplementary Material 2.

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Authors' contributions

Study design: BSK, PO, MSD, SO. Data collection: PO, MSD, SO. Data analysis: PO, BSK. Study supervision: BSK, PO, MSD, SO. Manuscript writing: BSK, PO, MSD, SO. Critical revisions for important intellectual content: BSK, PO, MSD, SO.

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Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from Balikesir University Health Sciences Non-Interventional Scientific Research Ethics Committee (Approval Date: 07.03.2023, Approval Number: 2023/25). The study was conducted in accordance with the principles of the Declaration of Helsinki. Written and verbal consent was obtained from the patients for the face-to-face administration of the data collection form.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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