

Online Health Information Seeking: Implications for Self-Management in Hypertension

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Background: Hypertension, a major cardiovascular disease risk factor, is a global public health challenge. Self-management is key, and with information and communication technology prevalence, online health information seeking behavior (OHISB) has become a common trend to boost patients' self-management.

Purpose: This study aims to explore hypertensive patients' OHISB and their impact on self-management practices, providing a basis for further improving patients' OHISB and self-management behaviors.

Patients and Methods: This study selected 312 hypertensive patients from the Cardiology Department of a Wuhan tertiary hospital (March–April 2025), using a general information questionnaire, revised version of the Online Health seeking behavior Scale (OHB-S) and the Hypertension Patients Self-Management Behavior Rating Scale (HPSMBRS) for surveys. SPSS 26.0 did descriptive analysis of enumeration/measurement data; *t*-tests/ANOVA analyzed group differences; multiple linear regression examined OHISB-influencing factors; Pearson correlation and hierarchical regression explored relationships between OHISB and self-management.

Results: The total scores of OHISB and self-management were (55.20±14.29) and (96.54±16.62) respectively in the patients. The total scores of OHISB and self-management were significantly positively correlated ($r=0.634$, $P<0.05$). The results of hierarchical regression analysis show that OHISB is an important influencing factor of self-management and can independently explain 21.2% of the variation in patients' self-management.

Conclusion: Both the OHISB and self-management behaviors of hypertensive patients are at a relatively low level. OHISB is an important influencing factor of self-management. Hypertensive patients with a higher level of OHISB have a higher level of self-management. In the future, information sources should be carefully controlled, and a variety of online health information channels should be combined to provide targeted online hypertension health education, thereby enhancing the self-management capabilities of hypertension patients.

Keywords: hypertension, online health information seeking behavior, self-management

Introduction

Hypertension is a significant risk factor for numerous cardiovascular diseases and represents a significant global health burden.¹ The first comprehensive analysis report² on global hypertension prevalence trends, released in 2019, showed that over the past 30 years, the number of adults aged 30–79 with hypertension has increased from 650 million to 1.28 billion. China is one of the countries with the fastest growth in hypertension prevalence. Despite the increasing prevalence of hypertension, the percentage of hypertensive patients with disease awareness, treatment and blood pressure control remains low.³ According to data from the “China Cardiovascular Health and Disease Report 2024”,⁴ the awareness rate, treatment rate, and control rate for hypertension among residents aged 18 and older are 43.3%, 38.7%, and 12.9%, respectively. Compared with developed countries (eg, the hypertension control rates for men and women in Canada are 64.0% and 56.9%, respectively, and in the United States, they are 44.8% and 51.0%²), the hypertension control rate in China remains at a relatively low level.

Self-management is a pivotal factor in the control of hypertension,⁵ and the enhancement of patient self-management can result in improved hypertension control and a reduction in the risk of stroke and heart disease.⁶ Scientific research⁷ shows that effective blood pressure control can significantly reduce the risk of complications. Specifically, every 10 mmHg reduction in systolic blood pressure or 5 mmHg reduction in diastolic blood pressure can reduce the risk of heart failure, stroke, retinopathy, and even death to varying degrees. However, the reality is that the current level of self-management among hypertensive patients is generally not ideal, with most still at a medium to low level.⁸ Meanwhile, there are significant differences in the types of self-management behaviors among hypertensive patients. Related studies⁹ have shown that drug management for patients with hypertension is superior to other management methods in terms of diet, exercise, and other aspects.

Lack of knowledge about hypertension is the main reason for poor blood pressure control in patients. This not only affects their medication adherence but also limits their self-management abilities and behaviors.¹⁰ Proactively seeking health information not only contributes to knowledge empowerment, but also significantly improves disease management awareness and self-management behaviors,¹¹ enabling patients to manage chronic diseases more effectively and improve their quality of life.^{12,13}

With the widespread adoption of information and communication technologies, the internet has become the primary means of information dissemination and an important channel for health information dissemination. The Seven-Step Action Plan for Hypertension Management in Asia proposed by HOPE Asia Network in 2022 also emphasizes the need to vigorously promote “internet+” technology.¹⁴ In recent years, especially affected by the novel coronavirus pandemic, health information dissemination has shown new trends. Health science information in the form of health management apps, TikTok short videos, WeChat public accounts, etc. has emerged one after another. At the same time, more and more hospitals, health systems, and other medical institutions are also launching online health services on social media.¹⁵ Online Health Information Seeking Behavior (OHISB) has become more and more prevalent due to its accessibility, convenience, interactivity and anonymity,¹⁶ and this trend is particularly prominent in China, where the proportion of people searching for health information online has exceeded 70%.

In recent years, researchers have gradually increased their efforts in studying OHISB. Erin Willis,¹⁷ through research on arthritis patients, found that seeking and exchanging health information in “online health communities” is beneficial for patients’ self-management. Mitsutake et al¹⁸ conducted a cross-sectional survey in Japan, which showed that patients with chronic diseases exhibited higher levels of online health information seeking behavior compared to healthy individuals. Zhou¹⁹ conducted qualitative interviews with nine patients with rheumatoid arthritis (RA) and found that these patients obtained online health information through multiple channels and at different points in time. However, a comprehensive analysis of existing domestic and international research indicates that studies on OHISB in patients with chronic diseases are still in their infancy and require further in-depth exploration. Relevant research in China remains at the qualitative research level and lacks relevant quantitative evaluation studies. In addition, there are few targeted studies on patients with hypertension, and there are also few reports on the interaction between OHISB and self-management behaviors in patients with hypertension. The objective of this study was to comprehend the present state of OHISB and self-management among hypertensive patients and to analyze the factors influencing them, with a view to providing a basis for more targeted intervention strategies and care measures.

Method

Sample

This study utilized convenience sampling to select hypertensive patients who attended the cardiology outpatient department of a Grade A Tertiary Hospital in Wuhan from March to April 2025 as research subjects. Inclusion criteria: 1) Defined as hypertensive according to the 2024 Chinese Guidelines for the Prevention and Treatment of Hypertension,¹⁴ including clinical systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg as well as outpatient systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg (who had never used anti-hypertensive drugs in three different visits); 2) aged ≥ 18 years; 3) required to have clear cognitive functions and be able to communicate effectively; 4) be able to use smart devices such as mobile phones or computers; 5) give informed consent and participate

in this study voluntarily. Exclusion Criteria: 1) Those who are unable to cooperate with the survey due to various reasons such as being in the critical stage of illness; 2) those who have a history of dementia or mental illness in the past. Following the method that requires a sample size of 5 to 10 times the number of items in the scale with the most items,²⁰ the scale used in this study contains a maximum of 33 items. With a 20% expansion of the sample size to account for potential invalid or missing samples, the estimated sample size ranges from 207 to 413 cases.

Research Tools

General Information Questionnaire

A self-designed general information questionnaire was selected, which included gender, age, education level, employment status, domicile location, family economic level, marital status, medical expense payment method, family history of hypertension, duration of hypertension, presence of complications, access and web-based access to health information.

Revised Version of the Online Health-Seeking Behavior Scale (OHB-S)

The Online Health-seeking behavior Scale (OHB-S) was developed by Popovac²¹ in 2022, and was revised for applicability in hypertensive patients based on the source scale. After obtaining authorization from the authors of the source scale, the translation was performed according to the BRISLIN translation model, and cross-cultural adaptation was performed through expert correspondence and cognitive interviews. The reliability and validity of the revised OHB-S were evaluated using a convenience sampling method with 374 hypertensive patients. The revised version of the OHB-S consists of 26 items, with a Cronbach's alpha coefficient of 0.934, fold-half reliability of 0.855, I-CVI of 0.875–1.000, S-CVI/Ave of 0.975, and S-CVI/Ave of 0.975. An exploratory factor analysis was performed, and four common factors with eigenvalues greater than 1 were extracted, with a cumulative variance contribution rate of 68.46%; the internal structure of the scale was further validated by a validation factor analysis, and the results showed that $X^2/df = 1.630$, RMSEA = 0.055, CFI = 0.950, and the model fit was good. The scale was scored on a Likert 5-point scale, with 1 being very non-compliant and 5 being very compliant, with higher scores indicating higher levels of OHISB in patients.

Hypertensive Patients of Self-Management Behavior Rating Scale

The hypertension patients of self-management behavior rating scale (HPSMBRS) was compiled by Liu Xiao²² et al in 2013, with a total of 33 entries divided into six dimensions: medication management, condition monitoring, diet management, exercise management, work and rest management, emotion management. A Likert 5-point scale was used, with scores from 1 to 5 representing: never, seldom, sometimes, often, and always, and the range of scores was from 33 to 165, with higher scores indicating higher levels of self-management behaviors in hypertensive patients. The content validity of the scale was 0.91, and the Cronbach's alpha coefficient was 0.914, with good reliability and validity.

Data Collection and Quality Control Methods

A trained investigator distributed questionnaires one-on-one at the site, explaining the purpose of the survey and precautions to the patients using a unified instruction language. After ensuring informed consent, patients were instructed to fill out the questionnaires independently, and when patients did not understand the content of the entries or could not fill out the questionnaires independently due to their own reasons, such as literacy, the investigator assisted in filling out the questionnaires by relaying and asking questions, and then the questionnaires were recovered on the spot after they were completely filled out. A total of 325 questionnaires were distributed in this study, 13 questionnaires with obvious irrationality or errors were excluded, and 312 valid questionnaires were recovered, with an effective recovery rate of 96%.

Ethical Consideration

This study has been approved by the Medical Ethics Committee. All study participants provided informed consent prior to their involvement, and no participants' names will be referenced during data collection, analysis, or presentation.

Statistical Methods

SPSS 26.0 software was used to analyze the data, the count data were described by the number of cases (%), the measurement data conforming to normal distribution were described by $\bar{x} \pm s$, the skewed distribution was expressed by M(P25, P75), and the comparison between the groups was performed by *t*-test or ANOVA. The correlation between two variables with normal distribution was assessed by Pearson's correlation analysis, while two variables that did not obey normal distribution were analyzed by Spearman correlation analysis. Variables that were statistically significant in the univariate numerator were selected for multivariate analysis using multiple linear regression models. Hierarchical regression is used to analyze the influencing factors of self-management. The test level $\alpha = 0.05$.

Result

General Information of Hypertensive Patients

Analysis of data from 312 research subjects found that hypertensive patients have diverse channels for obtaining health information and diverse online methods for obtaining health information (the details are shown in Table 1). Compared with traditional media, more than 90% of hypertensive patients obtain health information through the Internet. Short video platforms (such as TikTok), social media (QQ, WeChat, Rednote, etc), and search engines (Baidu, Google, etc) are the three most commonly used online channels for obtaining health information. With the widespread adoption of artificial intelligence technology, some patients have also begun using AI tools (such as DeepSeek and ChatGPT) to search for relevant health information. The average age of the patients in this study was (52.26 ± 11.73) years. Most participants were male (67.31%), urban residents (73.4%), married (93.91%), had employee medical insurance (64.42%), employed (62.50%), and had a family history of hypertension (72.76%). The distribution of patients with different levels of education and economic status is relatively even. Among all participants, 103 cases (33.01%) had a disease duration of less than 3 years, 96 cases (30.77%) had a disease duration of more than 10 years, and only 33 cases (10.58%) had a disease duration of 7 to 10 years. Among the participants, 144 cases (46.15%) had complications. Specific information is shown in Table 2.

Online Health Information Seeking and Self-Management Status of Hypertensive Patients

The raw scores of each scale in this study were transformed according to "Standardized score = (average factor score per person \div full score of each item) \times 100",²³ and the Standardized scores of hypertensive patients' online health information seeking and self-management behaviors were classified into three levels, corresponding to low (<60 points), medium (60~80 points) and high (>80 points) levels.²⁴ The scores for online health information seeking behavior, self-management behavior and scores for each dimension of hypertensive patients are shown in Table 3.

Table 1 Access and Web-Based Access to Health Information Among Hypertensive Patients (N=312)

Access to Health Information (Multiple Choice)	n (%)	Web-Based Access to Health Information (Multiple Choice)	n (%)
Medical staff	151 (48.4)	Search engines (Baidu, Google, etc)	162 (51.92)
Family & Friends	68 (21.79)	Social media (QQ, WeChat, rednote, etc)	174 (55.77)
Television	41 (13.14)	Short video platforms (TikTok, etc)	209 (66.99)
Broadcasts	10 (3.21)	Professional medical websites (DXY, etc)	10 (3.21)
Books	24 (7.69)	Knowledge Q&A sites (Zhihu, Post, etc)	14 (4.49)
Health Brochures	11 (3.53)	Official website of medical institutions	11 (3.53)
Internet	294 (94.23)	Academic databases (CNKI, WOF, etc)	1 (0.32)
		Medical & Health App	7 (2.24)
		AI tools (DeepSeek, Chatgpt, etc)	88 (28.21)

Table 2 Sample Characteristics, Univariate Analysis of OHISB and Self-Management Behaviors of Hypertensive Patients (N=312)

Characteristics	n (%)	*Standardized Score for OHISB($\bar{x} \pm s$)	F	P	*Standardized Score for Self Management Behavior ($\bar{x} \pm s$)	F	P
Age (years)			15.941	<0.05		1.134	0.32
18-44	87 (27.88)	46.84±12.50			59.89±11.33		
45-59	133 (42.63)	42.68±10.14			57.99±9.22		
>60	92 (29.49)	37.99±8.80			57.96±9.98		
Gender			0.119	0.74		6.657	<0.05
Male	210 (67.31)	42.61±10.75			57.49±9.96		
Female	102 (32.69)	41.15±11.51			60.60±10.02		
Education level			11.958	<0.05		6.900	<0.05
Junior high school and below	87 (27.89)	37.33±10.86			54.95±11.07		
High school	82 (26.28)	42.16±9.98			58.01±9.62		
Junior college	54 (17.31)	44.83±9.25			60.68±9.30		
Undergraduate and above	89 (28.53)	46.31±11.14			61.12±8.88		
Domicile location			5.481	<0.05		4.774	<0.05
Urban	229 (73.4)	43.33±10.90			59.25±10.00		
Rural	83 (26.6)	40.06±10.95			56.45±10.04		
Marital status			3.552	0.06		13.046	<0.05
Unmarried	19 (6.09)	47.04±14.84			66.44±10.37		
Married	293 (93.91)	42.16±10.66			57.99±9.85		
Medical expense payment method			6.139	<0.05		3.622	<0.05
Employee medical insurance	201 (64.42)	43.74±10.66			59.74±9.57		
Urban residents' medical insurance	57 (18.27)	41.19±9.93			56.13±10.33		
New rural cooperative medical care	49 (15.71)	37.47±10.40			55.79±10.68		
Self-financed	5 (1.60)	54.31±21.21			62.67±13.32		
Employment status			9.730	<0.05		0.612	0.54
Employed	195 (62.50)	44.50±11.38			58.46±10.50		
Retired	105 (33.65)	38.82±9.10			58.94±9.19		
Unemployed	12 (3.85)	41.09±12.11			55.56±10.77		
Total annual household income (thousand)			5.961	<0.05		1.085	0.36
<30	69 (22.11)	39.40±9.99			59.47±10.14		
30-80	64 (20.51)	40.06±9.72			56.65±9.61		
80-150	91 (29.17)	43.21±11.03			58.41±10.64		
>150	88 (28.21)	45.82±11.66			59.21±9.72		
Family history of hypertension			1.374	0.24		0.071	0.79
Yes	227 (72.76)	42.90±11.11			58.60±10.22		
No	85 (27.24)	41.27±10.65			58.26±9.73		
Duration of hypertension(year)			3.847	<0.05		0.150	0.93
<3	103 (33.01)	44.90±11.91			58.52±9.94		
3-6	80 (25.64)	42.71±11.16			58.01±10.44		
7-10	33 (10.58)	42.28±10.77			58.20±11.40		
>10	96 (30.77)	39.69±9.28			59.01±9.54		

(Continued)

Table 2 (Continued).

Characteristics	n (%)	*Standardized Score for OHISB ($\bar{x} \pm s$)	F	P	*Standardized Score for Self Management Behavior ($\bar{x} \pm s$)	F	P
Presence of complications			34.034	<0.05		64.428	<0.05
Yes	144 (46.15)	46.19±11.24			63.01±9.82		
No	168 (53.85)	39.26±9.72			54.65±8.60		

Notes: P value derived from one way ANOVA for continuous variables.*Standardized score = (average factor score per person + full score of each item) × 100.

Abbreviation: OHISB, online health information seeking behavior.

Univariate Analysis of Factors Affecting Online Health Information Seeking Behavior and Self-Management Behavior of Hypertensive Patients

The results of the univariate analysis showed that the differences in the online health information seeking behavior scores of hypertensive patients with different age, education level, domicile location, medical fee payment method, employment status, family economic level (total annual household income), duration of hypertension, and prevalence of complications were statistically significant ($P < 0.05$), participants with younger age, higher education, urban residence, self-financed/employee medical insurance, higher annual family income, shorter course of hypertension and complications had higher OHISB scores; differences in self-management behavior scores among hypertensive patients with different gender, education level, household location, spouse status, medical expense payment method, and comorbidity prevalence were statistically significant ($P < 0.05$), female, higher education, urban, unmarried, self-financed/employee health insurance, and participants with complications had higher self-management scores. The details are shown in [Table 2](#).

Correlation Between Online Health Information Seeking Behavior and Self-Management Behavior

Univariate Analysis of the Level of Online Health Information Seeking Behavior and Self-Management Behavior Scores of Hypertensive Patients

Univariate analysis showed that the difference in self-management behavior scores of hypertensive patients with different levels of OHISB was statistically significant ($P < 0.05$), as shown in [Table 4](#).

Correlation Analysis Between Online Health Information Seeking Behavior and Self-Management Behavior Scores of Hypertensive Patients

Pearson correlation analysis showed that the online health information seeking behavior scores of hypertensive patients were positively correlated with the total self-management behavior scores and the scores of each dimension ($P < 0.05$), as shown in [Table 5](#).

Hierarchical Regression Analysis of Self-Management Behavior of Hypertensive Patients

The total self-management behavior of hypertensive patients was used as the dependent variable, and the variables with statistically significant differences in the univariate analysis were included as independent variables in the first level model, and the OHISB score was included as an independent variable in the second level model, and hierarchical regression analysis were performed. The results showed that the first stratum: $R^2 = 0.290$, $P < 0.05$. The second stratum: $R^2 = 0.503$, $P < 0.05$, $\Delta R^2 = 0.212$, and the specific data are shown in [Table 6](#).

Multiple Linear Regression Analysis of Online Health Information Seeking Behavior Affecting Hypertensive Patients

Multiple linear regression analysis was performed using the online health information seeking behavior score as the dependent variable and the variables with statistically significant differences in the univariate analysis as the independent

Table 3 The Scores for OHISB, Self-Management Behavior and Each Dimension of Hypertensive Patients

Items	Number of Items	Raw Scores Range	Raw Scores ($\bar{x} \pm s$)	*Standardized Scores ($\bar{x} \pm s$)
Total scores for OHISB	26	31~115	55.20±14.29	42.46±11.00
Total scores for self management behavior	33	58~161	96.54±16.62	58.51±10.07
Medication management	4	4~20	17.09±3.61	85.43±18.07
Condition monitoring	4	5~19	10.96±2.42	54.82±12.09
Diet management	10	11~47	27.56±6.49	55.11±12.98
Exercise management	3	3~15	8.36±3.99	55.75±26.60
Work and rest management	5	7~25	13.73±2.56	54.91±10.23
Emotion management	7	8~35	18.84±4.55	53.83±13.00

Notes: *Standardized score = (average factor score per person ÷ full score of each item) × 100.

Abbreviation: OHISB, online health information seeking behavior.

variables. The results showed that four variables, age, education, duration of hypertension, and the presence of complications, were entered into the regression equation model (Table 7), with an $R^2=0.312$ ($P<0.05$).

Discussion

The Access and Web-Based Access to Health Information of Hypertensive Patients are Diverse

This study shows that the health information acquisition channels of hypertensive patients present the diversified characteristics of the coexistence of traditional media and digital platforms, but there is a significant difference in usage preference. The frequency of patients obtaining health information through channels such as television, radio, books and magazines, medical pamphlets, and family members and friends was low, and about 40% of patients would choose to consult a medical professional to obtain health information. Aimed by the popularity of the Internet, people with hypertension use the Internet much more than traditional media to obtain health information, with more than 90% of them obtaining health information online. Short video platforms such as TikTok are the most commonly used online channels for obtaining health information. In addition to individual users sharing health information, some professional healthcare providers also provide professional health education on TikTok. The information on TikTok is mainly presented in the form of pictures and videos, which is conducive to users of different age groups sharing and exchanging information in an easily accessible way.²⁵ In addition, social media (QQ, WeChat, Rednote, etc.) and search engines (Baidu, Google, etc.) are the second and third most frequently used online channels for obtaining health information. At the same time, the popularity of AI technology has made AI tools (DeepSeek, Chatgpt, etc.) another emerging online channel for obtaining health information.

Although emerging Internet technologies offer opportunities for better health communication and patient education, their use in health communication also has some limitations. Information quality is the most frequently mentioned issue in existing research.²⁶ On the one hand, the presence of incorrect health information online increases patient risk, as

Table 4 Univariate Analysis of the Level of OHISB and Self-Management Behavior Scores of Hypertensive Patients (N=312)

Level of OHISB*	n	Score of Self-Management Behavior ($\bar{x} \pm s$)	F	P
Low level (<60)	294	95.04±15.52	24.216	<0.05
Medium level (60~80)	17	121.82±15.14		
High level (>80)	1	107.00		

Notes: P value derived from one way ANOVA for continuous variables.*Standardized scores (average factor score per person ÷ full score of each item × 100) were classified into three levels: low (<60 points), medium (60~80 points) and high (>80 points) levels.

Abbreviation: OHISB, online health information seeking behavior.

Table 5 Correlation Analysis (r-Value) Between OHISB and Self-Management Behavior Scores of Hypertensive Patients (N=312)

Items	r	P
Total scores for self management behavior	0.634	<0.05
Medication management	0.565	<0.05
Condition monitoring	0.701	<0.05
Diet management	0.838	<0.05
Exercise management	0.660	<0.05
Work and rest management	0.584	<0.05
Emotion management	0.728	<0.05

Notes: P value derived from Pearson correlation analysis.

Abbreviation: OHISB, online health information seeking behavior.

Table 6 Hierarchical Regression Analysis of Self-Management Behavior in Hypertensive Patients (N=312)

Independent Variable	β	β^*	t	P
First level model				
(Constant)	119.414		12.397	<0.05
Gender	6.464	0.183	3.600	<0.05
Education level	3.854	0.273	4.885	<0.05
Domicile location	-0.769	-0.020	-0.348	0.728
Marital status	-11.348	-0.164	-3.344	<0.05
Medical expense payment method	1.398	0.059	1.097	0.273
Presence of complications	-13.288	-0.399	-8.217	<0.05
Second level model				
(Constant)	80.052		9.112	<0.05
Gender	5.834	0.165	3.872	<0.05
Education level	1.520	0.107	2.194	<0.05
Domicile location	-0.366	-0.010	-0.198	0.843
Marital status	-9.109	-0.131	-3.193	<0.05
Medical expense payment method	1.192	0.050	1.116	0.265
Presence of complications	-7.943	-0.239	-5.536	<0.05
Total scores for OHISB	0.600	0.516	11.392	<0.05

Abbreviation: OHISB, online health information seeking behavior.

patients may make health decisions based on inaccurate information.²⁷ On the other hand, the quality of unreviewed information poses challenges for healthcare providers, leading to patient distrust of healthcare providers. To address these issues, enhancing patients' ability to discern information quality,²⁸ intensifying efforts to combat inaccurate health information,²⁹ and ensuring professional information sources are areas that require continued attention in the future.

Online Health Seeking Behavior and Self-Management Behavior of Hypertensive Patients are at a Low Level

The results of this study showed that the Standardized score of online health seeking behavior of hypertensive patients was (42.46±11.00), suggesting that the level of online health seeking behavior of hypertensive patients is poor and online health seeking ability needs to be further improved. This may be related to the age characteristics of the study population in this study,³⁰ the average age of the patients in this study was (52.26±11.73) years old, and more than 70% of the patients were middle-aged or elderly patients. An analysis³¹ of Health and Aging Trends Study (NHATS) in the United States shows that older adults use internet technology less than the general population, with only 16% of older adults using health technology to obtain health information, compared to 60% of younger adults. Older patients may face

Table 7 Multiple Linear Regression Analysis of OHISB of Hypertensive Patients (N=312)

Independent Variable	β	β'	t	P
(Constant)	88.233		11.695	<0.05
Age(year)	-0.353	-0.290	-4.359	<0.05
Education level	2.197	0.181	3.080	<0.05
Domicile location	2.078	0.064	1.096	0.274
Medical expense payment method	0.481	0.023	0.444	0.658
Employment status	-1.137	-0.045	-0.726	0.468
Total annual household income (thousand)	-0.372	-0.029	-0.460	0.646
Duration of hypertension(year)	-1.208	-0.118	-2.051	<0.05
Presence of complications	-11.499	-0.402	-7.894	<0.05

Abbreviation: OHISB, online health information seeking behavior.

barriers when seeking online health information, due to factors such as limited educational attainment, insufficient health literacy, and lack of access to information sources.³²

The total standardized score of self-management behavior was (58.51±10.07), which was less than 60 points, which was consistent with the results of previous studies,^{33–35} which showed that the self-management behavior of hypertensive patients in this study was at a low level. By analyzing the scores of the dimensions of self-management behaviors, it was found that the standardized score of medication management was (85.43±18.07), but the standardized scores of condition monitoring management, diet management, exercise management, work and rest management, and emotion management were all less than 60. This indicates that all the dimensions of management were at a low level except for medication management which was at a high level.

On the one hand, it may be due to the fact that most of the patients included in this study came from hospital outpatient clinics, and this population has a relatively high awareness of seeking medical care and treatment of diseases;³⁶ on the other hand, taking anti-hypertensive medication is easier to implement compared to other aspects of management. In addition, this study used on-site questionnaires to be filled out for a face-to-face survey, and the patients may conceal their bad medication habits while embellishing their medication management behaviors when confronted with medical staff.³⁷ It also suggests that the current disease management methods used by hypertensive patients are relatively limited, and the vast majority of hypertensive patients are overly reliant on medication, neglecting to improve and manage their lifestyles. Some studies³⁸ have shown that the use of healthy lifestyles such as dietary modification, exercise management, stress and emotion management to control blood pressure in the early stages of hypertension disease will be more effective than drug treatment. However, in the actual prevention and treatment of hypertension, these aspects often fail to receive due attention from patients.³⁴

Factors Influencing Online Health-Seeking Behavior in Patients with Hypertension

Exploring the factors influencing OHISB using multiple linear regression showed that age, education level, duration of hypertension and presence of complications influenced OHISB in hypertensive patients. Similar to the findings of a previous study,³⁹ the level of OHISB was significantly higher in young hypertensive patients than in middle-aged patients, and even higher than in older patients. On the one hand, many older adults face issues such as low literacy, lack of basic health knowledge, limited digital literacy, underdeveloped information literacy, and low eHealth literacy. Additionally, older patients have low self-efficacy when it comes to using electronic devices, reading, learning, and evaluating health information⁴⁰ and are more likely to have negative attitudes towards online information compared with young patients. On the other hand, patients' hearing, vision, cognitive and technological abilities may deteriorate with age,⁴¹ and these changes may affect patients' access to and understanding of health information,⁴² which may constitute a "digital divide" that hinders patients' OHISB. Additionally, issues such as inappropriate font sizes, dense text, disorganized layouts, and complex website designs can lead to unpleasant and frustrating user experiences for older adults,⁴⁰ thereby dampening their enthusiasm for seeking online health information. Given these issues, it is

recommended that various websites and mobile applications promote “age-friendly” design (such as voice interaction and large font interfaces) and conduct offline guidance and training for the elderly through healthcare professionals, community workers, volunteers, etc, to enhance the ability of elderly patients to use internet tools and reduce barriers in the process of seeking online health information.

Consistent with existing studies,^{43,44} there was a significant increase in the level of patients’ OHISB as their level of education increased. This may be due to the fact that more educated patients have a stronger sense of learning,⁴⁵ are more proficient in using computers, mobile phones and other smart devices, and have more opportunities and ways to obtain health information online, which may facilitate patients’ access to and understanding of online health information;⁴⁶ meanwhile, patients with higher levels of education may correspond to busier work schedules and less disposable free time, and may be more likely to obtain health information through the Internet than through offline healthcare. At the same time, patients with higher literacy levels may have busier work schedules and less free time, making it easier for them to obtain health information through the Internet than through offline medical care, thus meeting their needs more easily. In response to the impact of educational attainment, professional medical institutions, healthcare workers, and official media outlets should take into full consideration the different educational levels of various groups when providing health information, and should use easy-to-understand formats such as video explanations and illustrated science popularization to conduct health education. At the same time, public health and community services should be strengthened, and offline lectures and door-to-door services should be used to help people who have difficulty using smart devices improve their ability to use them.

The duration of hypertension also affects patients’ levels of OHISB. The study found that patients’ levels of OHISB decreased as the duration of hypertension increased. Patients with a disease duration of less than 3 years had significantly higher OHISB scores than the other patients with longer disease duration. This may be due to the fact that as disease duration increases, patients become more aware of their own health condition, their knowledge about hypertension gradually increases, and their experience in managing the disease continues to accumulate, so that patients with longer disease duration are less likely to engage in information seeking. Therefore, for patients who have been ill for a short period of time, health information providers need to ensure the quality and quantity of hypertension-related health information, provide comprehensive disease control methods and self-management knowledge, and meet patients’ health needs. At the same time, for patients who have been ill for a long period of time, medical staff and community health workers also need to follow up to prevent patients from underestimating the harm of the disease itself or developing inertia thinking due to the long duration of the disease, and correct patients’ misconceptions about the disease.

The level of OHISB was significantly higher in hypertensive patients with complications than in those without, this is consistent with the existing research results.³¹ This may be due to the fact that patients with complications have a worse physical condition and prognosis, leading to a higher perceived risk of cardiovascular disease⁴⁷ and a greater willingness to seek information to improve the management of their disease.⁴⁸ Therefore, healthcare providers need to pay special attention to patients with complications, providing them with professional health knowledge to help them manage their diseases and control complications. For patients who have not yet developed complications, it is even more important to make them aware of the risks of poor blood pressure control and the potential for serious complications, thereby increasing their risk awareness and encouraging them to actively seek health information and knowledge related to disease management.

Factors Influencing Self-Management Behavior in Hypertensive Patients

Influence of General Information on the Self-Management Behavior of People with Hypertension

The results of this study showed that gender, level of education, presence of a spouse and presence of complication were the factors influencing the self-management behavior of hypertensive patients. Consistent with the results of national and international studies,^{49,50} female hypertensive patients have a higher level of self-management compared to men. On the one hand, women have greater autonomy in blood pressure management behaviors such as weight control, dietary control and exercise⁵¹ and are more likely to recognize the possible adverse consequences of not self-managing;⁵² on the other

hand, men are more exposed to the dual pressures of work and family and tend to ignore the adverse effects of the disease on their own health and that of their families, leading to a weak sense of self-management and poor self-management.⁵³

Consistent with the findings of Mao⁵⁴ et al the level of education also affects the level of self-management in patients with hypertension, and the level of self-management behaviors is higher in patients with higher education than in patients with lower education. The reason for this may be that patients with a higher level of education have a greater capacity to learn, are more aware of the disease of hypertension, are more likely to recognize the importance and necessity of self-management and, at the same time, are able to learn and master the relevant disease management skills in a variety of ways to further strengthen the level of self-management. Therefore, it is necessary to strengthen health education for patients with low levels of education through various forms of online publicity and offline lectures to help patients fully understand hypertension, recognize the importance of blood pressure control and management, and acquire knowledge and skills for disease management.

Contrary to existing studies,⁵⁵ the higher level of self-management behaviors in unmarried hypertensive patients may be due to the fact that the unmarried hypertensive patients included in the present study were mostly from the student population, a group with a higher level of literacy and a stronger sense of self-management. In addition, there were only 19 unmarried subjects in this study, which could easily lead to biased results.

The presence or absence of complications reflects the overall physical condition of the hypertensive patient. The more severe the disease and the worse the physical condition of the patient, the greater the awareness of the disease and the cooperation in self-management. These patients will have a greater desire to lower their blood pressure levels, control the progression of hypertension, reduce complications and improve their quality of life. Patients without complications may lack insight into the potential health complications of long-term elevated blood pressure,⁵⁶ and this overall lack of insight undermines patients' long-term adherence to anti-hypertensive treatment. Without an understanding of the complications of uncontrolled blood pressure, patients lack the motivation to persist with self-management over the long term. Therefore, it is essential for hypertensive patients to fully understand the serious consequences of poor blood pressure control and to correctly recognize hypertension.

The Level of Online Health-Seeking Behavior in Hypertensive Patients Has a Significant Influence on Self-Management Behavior

The results of the correlation analysis showed that the OHISB score was significantly and positively correlated with the total self-management score and the scores of each dimension. After controlling for the confounding effect of general information, the results of the hierarchical regression analysis showed that the OHISB score explained 31.2% of the variance in the level of self-management behavior, and patients with higher levels of OHISB also had higher levels of self-management.

In the digital era, the emergence of the Internet has had a significant impact on the dissemination of health information, and by December 2024, the number of Internet users in China had reached 1.108 billion, the Internet penetration rate had increased to 78.6%, and the number of Internet medical users had reached 418 million.⁵⁷ Compared with traditional health information channels, the Internet provides accessible, multidimensional and continuously updated health information. Hypertension patients can conveniently access professional knowledge about medication contraindications, dietary standards, and exercise plans for hypertension through various channels such as short video science popularization on TikTok, WeChat official account articles, and online consultation platforms of medical institutions. Driven by their health information needs and cognitive motivations, patients use online tools to search, browse, evaluate, and select health-related knowledge or information.⁵⁸ The shift from passively receiving health information to actively screening health information not only enhances patients' understanding and awareness of diseases, but also helps them assess their health status more accurately, providing a cognitive foundation for scientific self-management. Several systematic reviews^{59–61} have also demonstrated that hypertension patients who use apps that provide necessary treatment knowledge and lifestyle change counseling experience improvements in blood pressure control and medication adherence.

In addition, the rapid development of online technology has created a new online support environment for patients, helping them transition from individual isolation to collective collaboration and strengthening their motivation for self-

management. A study on diabetes patients⁶² also showed that by accessing information on social media platforms, patients not only received informational support but also emotional and social support. Patients reduced their reliance on single medical opinions by engaging with diverse experiences; they alleviated feelings of loneliness through the validation of “I have had similar experiences”; and by accessing real-life experiences and specific cases from other online users (such as WeChat patient support groups), they obtain replicable coping strategies.⁶³ Seeking health information online significantly reduces patients’ uncertainty about their disease, treatment, and prognosis, decreases negative emotions associated with uncertainty,⁶⁴ enhances their sense of control over their condition and confidence in self-management,⁶⁵ and ultimately promotes self-management.⁶⁶

Conclusion

At present, the OHISB and self-management behavior of hypertensive patients are both at a low level, and the two are positively correlated, with a higher level of self-management in patients with higher OHISB. Therefore, it is necessary to accurately identify the obstacles in the process of patients’ online health information seeking, and provide targeted services for elderly patients, those with low education level, no complications and different years of disease, so as to help them better obtain help from Internet technology. Medical personnel, public health organizations, and grassroots health care departments should control information sources, improve information quality, combine multiple online health information channels, make full use of the characteristics of platforms such as TikTok and WeChat, adopt forms that are easy for patients to understand, such as videos and graphics, provide targeted online health education on hypertension, enhance patients’ awareness of the disease and self-management, improve the self-management ability of patients with hypertension, and reduce the risk of cardiovascular disease.

This study also has some limitations. Both OHISB and self-management behavior levels were assessed using questionnaires and scales completed by patients themselves, resulting in a high degree of subjectivity. Future studies may consider incorporating objective evaluation methods or dynamic tracking evaluation methods to provide a more comprehensive and accurate assessment of OHISB levels and self-management behavior levels among hypertensive patients. Additionally, due to geographical limitations, this study only selected patients from one tertiary hospital in Wuhan as research subjects. When extrapolating conclusions, caution is required. In the future, the scope of the study could be expanded to conduct multi-center research, further identifying the factors that promote and hinder online health-seeking and self-management in hypertension patients, with the aim of developing more targeted and efficient online health-seeking and self-management intervention strategies.

Data Sharing Statement

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

Ethics Approval and Informed Consent

This study has been approved by the Medical Ethics Committee of Tongji Hospital affiliated with Tongji Medical College of Huazhong University of Science and Technology (TJ-IRB202412204). Written informed consent was obtained. The study complied with the Declaration of Helsinki.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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The authors declare no conflicts of interest in this work.

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