

Influencing factors of self-management ability among dry eye patients in west China

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Abstract

• **AIM:** To investigate the current situation and influencing factors of self-management ability in dry eye patients in west China.

• **METHODS:** A total of 265 patients clinically diagnosed with dry eye received a convenience survey questionnaire at West China Hospital of Sichuan University. All participants completed the rating scale of health self-management skill for adults (AHSMSRS), Huaxi Emotional-Distress Index (HEI), e-health literacy scale (e-HEALS) and Brief Illness Perception Questionnaire (Brief-IPQ). A generalized linear model was employed to establish a multivariate linear model with demographic data, psychological state, e-HEALS, and illness perception as independent variables and health self-management skill score as the dependent variable.

• **RESULTS:** The mean score for health self-management skill was 165.58 ± 15.79 . Multivariate analysis revealed that advanced age, better illness perception and improved psychological state were associated with better health self-management ability among dry eye patients. Furthermore, the health self-management ability of patients with a disease duration less than 1y was found to be higher compared to those with a disease duration exceeding 1y.

• **CONCLUSION:** The health self-management ability of dry eye patients in west China is relatively high. Age, duration of disease, illness perception and psychological state are the influencing factors on the health self-management ability of dry eye patients.

• **KEYWORDS:** dry eye; self-management ability; influencing factors

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INTRODUCTION

Dry eye is a chronic ocular surface disease resulting from multiple factors, characterized by tear film instability or an imbalance in the ocular surface microenvironment caused by abnormal tear quality, quantity, and dynamics. It may be accompanied by ocular surface inflammatory response, tissue damage, and nerve abnormalities, leading to various symptoms of ocular discomfort and visual dysfunction^[1]. The etiology of dry eye is multifactorial, encompassing an unhealthy lifestyle, advanced age, endocrine-related factors, psychological factors, environmental pollution, systemic diseases, local ocular pathological changes, and other contributing factors^[2-3]. The treatment approach for dry eye emphasizes long-term individualized care based on the type and severity of the condition^[4-5], while also promoting patient adaptation to a chronic disease management system^[6]. The 2020 Chinese Dry Eye Expert Consensus^[1] highlights the cumulative nature of dry eye development as well as the long-term nature of its treatment process.

In the process of chronic disease prevention and control, there is a focus on medication adherence, adopting a healthy lifestyle including diet and exercise, as well as managing emotional well-being. All these aspects require individuals to take charge of their own health. Chronic disease self-management emphasizes cognitive adjustment and behavioral change in recognizing one's own health issues and empowering individuals to take initiative^[7]. Self-management ability has been extensively studied in chronic diseases such as diabetes mellitus, rheumatoid arthritis, coronary heart disease, and asthma^[8-11], demonstrating its positive impact on treatment outcomes and rehabilitation processes, thereby influencing individual health outcomes.

According to epidemiological surveys conducted in Asia and Europe, the prevalence of dry eye ranges from 5% to 50%. The Tear Film and Ocular Surface Society (TFOS) report in Dry Eye Workshop (DEWS) II^[12] identifies Asian ethnicity as a significant risk factor for dry eye, with the risk increasing

linearly with age. In China, besides facing a rapidly aging society, the rapid advancement of science and technology has also brought about lifestyle changes that may contribute to dry eye that has become a major public health concern affecting both older adults and younger individuals^[13-15]. Currently, the research on dry eye primarily focuses on disease assessment, diagnosis, treatment methods, and pathogenic factors^[16-18]. Dry eye as a chronic disease, it is crucial to pay attention to the health self-management ability of the patients. However, there has been no previous investigation into the health self-management ability of these patients. Therefore, this study aims to examine the present status of health self-management ability among individuals with dry eye, explore relevant factors influencing their self-management capacity, and establish a foundation for developing strategies to enhance their self-management abilities.

SUBJECTS AND METHODS

Ethical Approval This study was approved by the Biomedical Ethics Committee of West China Hospital of Sichuan University, with ethics lot No.2023 (1482). All participants gave informed consent and volunteered to participate in the study.

Study Design and Subjects This study was a cross-sectional survey study. A convenient sampling method was used to investigate patients diagnosed with dry eye by ophthalmologists in the Ophthalmology Clinic of West China Hospital of Sichuan University from September, 2023 to November, 2023. The West China Hospital of Sichuan University is a grade A tertiary hospital and the diagnosis and treatment center for mysterious and severe diseases in West China.

The inclusion criteria were as follows: 1) Dry eye was diagnosed by an ophthalmologist for more than 1mo; 2) age ≥ 18 years old; 3) volunteered to participate in this study; 4) Chinese nationality and use Chinese language to communicate. The exclusion criteria were: 1) patients diagnosed with psychiatric diseases; 2) patients with communication disorders or cognitive impairment who could not complete the survey.

Survey Methods The recruitment of study participants was conducted by the project team's doctors and nurses at the Ophthalmology Clinic of West China Hospital, Sichuan University. Patients diagnosed with dry eye by an ophthalmologist and who met the inclusion criteria were enrolled in the study. The questionnaires were completed by face-to-face interviews conducted by nurses. The interviewers collected the following data: 1) demographic characteristics of patients (such as age, gender, and educational level); 2) health self-management ability and risk factors [psychological states, e-health literacy scale (e-HEALS) and illness perception)].

Tools of Survey

The rating scale of health self-management skill for adults

The rating scale of health self-management skill for adults

(AHSMSRS), developed by Huang *et al*^[19] from the School of Nursing at Harbin Medical University in 2011, is utilized to assess the overall level of health self-management in adults. It encompasses three dimensions: health self-management behavior (14 items), health self-management cognition (14 items), and health self-management environment (10 items), totaling 38 items. The Likert 5-level scoring method was employed, with each item scored on a scale of 1 to 5, generating a range of scores from 38 to 190 points. A higher total score indicates better health self-management ability^[20]. Based on the scale's grading standard, scores between 38 and 76 are classified as low level, scores between 77 and 152 as medium level, and scores between 153 and 190 as high level^[21]. The overall Cronbach's α coefficient for this scale was 0.93.

Huaxi Emotional-Distress Index The psychological states of patients were evaluated by using Huaxi Emotional-Distress Index (HEI)^[22]. This scale was developed by the West China Hospital of Sichuan University, which is mainly used for the rapid screening and evaluation of emotion-related disorders and psychological health status and can also evaluate the negative emotions of hospitalized patients with depression, such as depressive emotion, anxious emotion, and suicidal attempt. HEI can be completed within a short time (2-3min). It consists of 9 items that are scored by the 5-level Likert scale, with 0 point indicating "never", 1 point indicating "occasionally", 2 points indicating "some of the time", 3 points indicating "most of the time", and 4 points indicating "nearly all the time". The total HEI score ranges from 0-36 points, with a total score ≤ 8 points indicating no negative emotions, 9-12 points indicating slight negative emotions, 13-16 points indicating moderate negative emotions, and ≥ 17 points indicating severe negative emotions. This scale was designed for the screening of patients with depression or anxiety in non-psychiatric clinical practices. The total Cronbach's α coefficient of HEI was 0.917^[23].

E-Health literacy scale The concept of e-HEALS was introduced by Norman and Skinner^[24] in 2006, encompassing the multidimensional skills required by individuals to access, comprehend, evaluate health information from electronic media, and utilize this knowledge to address health-related issues. The e-HEALS serves as the pioneering assessment tool for evaluating e-HEALS and primarily focuses on measuring internet users' self-perceived abilities in seeking and applying online health information^[24]. The Chinese version of e-HEALS utilized in this study was translated into Mandarin by Guo *et al*^[25], based on the original English version of e-HEALS. This scale comprises eight items that assess various aspects such as application proficiency in utilizing online health information and services (items 1-5), judgment capabilities (items 6-7), and decision-making skills (item 8). A Likert-5

scale was employed with response options including “very inconsistent”, “somewhat inconsistent”, “unclear”, “somewhat consistent”, and “very consistent” scored as 1, 2, 3, 4, and 5 points, respectively. Each respondent’s total score is calculated by summing up their scores across all questions. Higher total scores indicate a greater level of e-HEALS among respondents. The internal consistency reliability coefficient Cronbach’s α for this scale was 0.913.

Brief Illness Perception Questionnaire The Brief Illness Perception Questionnaire (Brief-IPQ), developed by Broadbent *et al*^[26], is commonly utilized to assess patients’ disease awareness. The Chinese version of the Brief-IPQ utilized in this study was translated into Chinese by Sun *et al*^[27]. This questionnaire comprises four dimensions and nine items, namely perception description dimension, emotional description dimension, comprehensive understanding dimension, and etiology perception dimension. The scoring method employs a 0-10 scale, with items 3, 4, and 7 being reverse scored while the remaining five items are positively scored. The illness perception score can be obtained by summing the first eight items. A higher score indicates a greater psychological perception of the disease’s impact on physical function impairment and distress for patients. One item within the etiology perception dimension consists of an open-ended question where patients list their top three main causes of illness; this item does not contribute to the total score of the illness perception questionnaire. The overall Cronbach’s α coefficient for this scale was found to be 0.831^[27].

Statistical Analysis The quantitative data and qualitative data in this study were described by means and standard deviations or ratios (constituent ratios), respectively. The Pearson correlation coefficient was utilized to examine the association between age, HEI, e-HEALS, illness perception, and health self-management skill scores. A two independent sample *t*-test was employed to analyze the relationship between gender, education level, other chronic diseases, duration of dry eye diagnosis, and health self-management skill scores. In case when significant differences was observed, the SNK method was subsequently applied to test pairwise differences among groups. Furthermore, a generalized linear model was constructed using general data (age, gender, education level, occupation, presence of other chronic diseases and duration of dry eye diagnosis), illness perception score as well as HEI and e-HEALS variables as independent factors while considering health self-management skill score as the dependent variable. $P < 0.05$ was considered statistically significant.

RESULTS

A total of 265 patients diagnosed with dry eye were included in the study, comprising 72 males and 193 females. Among them, there were 106 cases with an education level of high

Table 1 Statistical description of continuous variables

Variables	Mean±SD
Age	43.13±14.16
HEI	2.44±3.20
e-HEALS	23.37±13.06
Brief-IPQ	48.31±9.36
Self-management behaviors	54.10±9.28
Self-management environment	44.45±5.61
Self-management cognition	67.04±4.66
Self-management skill	165.58±15.79

SD: Standard deviation; HEI: Huaxi Emotional-Distress Index; e-HEALS: e-health literacy scale; Brief-IPQ: Brief Illness Perception Questionnaire.

Table 2 Univariate analysis of continuous variables and health self-management skill scores

Variables	<i>r</i>	<i>P</i>
Age	0.12	0.05
e-HEALS	-0.01	0.90
HEI	-0.16	0.01
Brief-IPQ	0.04	0.55

e-HEALS: e-health literacy scale; HEI: Huaxi Emotional-Distress Index; Brief-IPQ: Brief Illness Perception Questionnaire.

school or below, and 159 cases with an education level of above high school. Additionally, there were 34 cases involving manual workers, 106 cases involving office workers, and 125 cases involving individuals from other occupations. Moreover, there were 80 cases presenting other chronic diseases while the remaining 185 cases did not have any other chronic diseases. The duration of dry eye diagnosis was less than one year for a total of 135 patients and more than one year for another group consisting of 130 patients. The age distribution as well as the HEI, e-HEALS scores, Brief-IPQ scores, overall score and individual dimension scores related to health self-management skill were presented in Table 1.

The Pearson correlation coefficient was employed to examine the association between age, HEI, e-HEALS, and health self-management skill scores. The corresponding results were presented in Table 2. HEI exhibited significant correlations with health self-management skill scores.

The relationship between gender, education level, other chronic diseases, duration of dry eye diagnosis, and health self-management skill scores was analyzed using an independent sample *t*-test. Additionally, the relationship between occupation and health self-management skill scores was examined through analysis of variance. In case of any significant differences observed, pairwise comparisons between groups were conducted using the SNK method. The results were presented in Table 3.

A generalized linear model was employed to establish a multivariate linear model, incorporating general information (including age, gender, education level, occupation, other

Table 3 Univariate analysis of categorical variables and health self-management skill scores

Variables	Self-management skill score	t/F	P
Gender		t=0.10	0.92
Male	165.74±13.84		
Female	165.53±16.49		
Level of education		t=-2.00	0.05
High school and below	163.22±17.35		
Above high school	167.16±14.50		
Other chronic diseases		t=-0.51	0.61
No	165.25±15.42		
Yes	166.36±16.70		
Duration of dry eye diagnosis		t=1.82	0.07
1y or less	167.31±15.86		
More than 1y	163.79±15.58		
Occupations		F=2.20	0.11
Manual laborer	161.32±18.94		
Office workers	167.60±14.24		
Other	165.03±15.97		

chronic diseases, and duration of dry eye diagnosis), illness perception, HEI and e-HEALS as independent variables. The health self-management skill score was considered as the dependent variable. The findings were presented in Table 4.

With the increase of age and disease illness perception, the score of health self-management skill gradually increased, and the average increase of health self-management skill score was 0.19 ($P=0.02$) for every 1y increase in age. For every 1 point increase in illness perception score, the average health self-management skill score creased by 0.29 ($P=0.02$). With the increase of HEI, the health self-management skill score gradually decreased. For every 1 point increase of HEI, the health self-management skill score decreased by an average of 1.12 ($P<0.01$). The health self-management skill score of patients diagnosed with dry eye more than 1y was 4.66 lower than that of patients diagnosed less than 1y ($P=0.03$).

DISCUSSION

A total of 265 dry eye patients were enrolled in this study, with an average age of 43.13±14.16y. The overall health self-management skill score for the participants was 165.58±15.79, indicating a high level of health self-management ability among dry eye patients in west China, surpassing both the health self-management skill scores of elderly individuals in Shanghai community (150.86±23.93)^[28] and Fuzhou (143.90±17.52)^[21]. Further analysis revealed that among the three dimensions of the health self-management skill scale for dry eye patients, the score for health self-management cognition was found to be the highest (67.04±4.66), followed by health self-management behavior (54.10±9.28), and finally, the score for health self-management environment was

observed to be the lowest (44.45±5.61). Self-management cognition refers to individuals' beliefs about their own health and their confidence in managing it effectively to prevent diseases and maintain well-being. Self-management behavior encompasses actions taken by individuals to proactively manage their own health, such as dietary choices, exercise routines, and responses to illnesses or symptoms. Lastly, self-management environment pertains to how individuals utilize available resources and adapt their surroundings in order to prevent diseases and safeguard their own health^[20]. The findings suggest that individuals with dry eye exhibit robust health beliefs and self-efficacy, yet their health management behaviors necessitate reinforcement, particularly in terms of underutilization of available resources. Targeted intervention initiatives can be implemented by healthcare professionals to further enhance the self-management ability of patients with dry eye.

Multivariate analysis showed that for every 1y increase in age of dry eye patients, the score of health self-management skill increased by 0.19 points ($P=0.02$), indicating that the older the dry eye patients were, the stronger the health self-management ability was. It is consistent with the results of Luo *et al's*^[29] study on self-management ability of patients with type 2 diabetes. This is related to the fact that older dry eye patients are more concerned about their personal health and are more likely to adopt healthier behaviors in diet, exercise and lifestyle. The self-management skill score of patients diagnosed with dry eye more than 1y was 4.66 lower than that of patients diagnosed less than 1y ($P=0.03$). This may be attributed to the fact that patients with dry eye exhibit heightened vigilance towards their own health during the early stages of the condition, aiming to alter its prognosis through adopting healthy behaviors; however, sustaining long-term adherence to healthy self-discipline poses a greater challenge. Research^[30] has demonstrated that integrating individuals with chronic diseases into a comprehensive management system, involving regular follow-ups and professional interventions, can effectively enhance their capacity for self-managing their health and consequently improve their overall well-being. The Chinese Dry Eye Expert Consensus^[6] also emphasizes the chronic nature of dry eye treatment and advocates for its integration within a chronic disease management framework. Multivariate analysis showed that for every 1 point increase in illness perception score, the score of health self-management skill increased by 0.29 ($P=0.02$) on average. The higher the illness perception, the better the health self-management ability. As an important psychological variable, illness perception has become a research hotspot in chronic disease management in recent years, and its role in chronic disease health management has become more and more prominent^[31].

Table 4 Multiple regression analysis of health self-management ability (n=265)

Variables	Regression coefficient		Standardized regression coefficient	t	P
	β	Std. Err			
Intercept	145.23	7.11	-	20.44	0.00
Age	0.19	0.08	0.17	2.40	0.02
Gender (with female as the control group)					
Male	1.27	2.19	0.04	0.58	0.56
Occupations (with other as the control group)					
Manual laborer	-1.40	3.28	-0.03	-0.43	0.67
Office workers	2.08	2.18	0.06	0.95	0.34
Other chronic diseases (with no as the control group)					
Yes	0.89	2.20	0.03	0.40	0.69
Level of education (with high school and below as the control group)					
Above high school	4.32	2.36	0.13	1.83	0.07
Duration of dry eye diagnosis (with 1y or less as the control group)					
More than 1y	-4.66	2.14	-0.15	-2.18	0.03
e-HEALS	-0.03	0.09	-0.02	-0.28	0.78
HEI	-1.12	0.33	-0.23	-3.44	0.00
Illness perception	0.29	0.12	0.17	2.44	0.02

Regression model testing: $F=3.06$, $P<0.01$; Goodness of fit: coefficient of determination =0.33. e-HEALS: e-health literacy scale; HEI: Huaxi Emotional-Distress Index.

Patients' perception of the illness directly predicts their self-management behavior and influences their recognition of the disease's threat and urgency. Furthermore, a greater understanding of the disease and belief in its effective control leads to increased active participation in disease self-management and cooperation with treatment^[32]. Positive illness perception significantly impacts patients' ability to manage their condition. Medical professionals should consider illness perception as a starting point for implementing interventions, conducting appropriate interventions based on patients' lack of understanding regarding chronic diseases^[33].

This study showed that with the increase of HEI, the score of health self-management skill of dry eye patients gradually decreased, and for every 1 point increase of HEI, the average score of health self-management skill decreased by 1.12 ($P=0.00$). The more negative emotions and psychological health status of dry eye patients, the worse their health self-management ability. Studies have found that patients with greater psychological stress have lower tear meniscus height and worse tear film stability^[34], and the destruction of tear film stability is the main cause of dry eye in patients^[35]. Other studies have found that dry eye patients generally have short sleep duration and poor sleep quality, and individuals with sleep disorders have a higher prevalence of dry eye^[36]. The emotional and psychological well-being of individuals is closely intertwined with their sleep status. It can be inferred that the psychological health condition of patients with dry eye not only impacts their ability to manage their own health but

also directly influences the onset and progression of dry eye disease. Moreover, a compromised psychological health state may further impede self-management ability and exacerbate the severity of dry eye symptoms. Therefore, healthcare professionals should prioritize the psychological well-being of patients with dry eye and promptly implement effective interventions for addressing any psychological distress.

The e-HEALS of dry eye patients did not demonstrate a significant impact on their health self-management ability in this study. This observation may be attributed to the inclusion of outpatients from a tertiary hospital, who have greater access to disease-related knowledge through hospital resources.

Our study had several limitations. First, it was a cross sectional design and was inherently limited in its inability to confirm the cause-and-effect relationship between psychological status, perception of illness, and health self-management ability of dry eye patients. Longitudinal studies are required to further clarify these relationships. Second, influencing factors were self-reported by volunteers, which might have induced recall bias. Nevertheless, this can be considered as an inherent limitation of any survey-based study. Moreover, the study was carried out in the same hospital, which may have introduced selection bias.

In conclusion, the health self-management ability of dry eye patients in west China is relatively high. Age, duration of disease, illness perception, and psychological state are the influencing factors on the health self-management ability of dry eye patients.

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