

# Comparison of health literacy and health behaviors between Korean women with and without breast cancer

Goeun Chung<sup>1</sup>, Hye-Jin Kim<sup>2</sup><sup>1</sup>Regional and Rheumatoid Arthritis Diseases Center, Jeju National University Hospital, Jeju, Korea<sup>2</sup>Department of Nursing, University of Ulsan, Ulsan, Korea

**Purpose:** This descriptive survey compared health literacy and health behaviors between Korean women with and without breast cancer.

**Methods:** In total, 95 women with and 97 women without breast cancer (age range: 40-69 years) completed the survey. Health literacy and health behavior were analyzed in women with and without breast cancer, using the Newest Vital Sign.

**Results:** Women with breast cancer were less frequently alcohol drinkers (14.7% vs. 47.4%,  $p < .001$ ) and more frequently exercised (65.3% vs. 49.5%,  $p = .027$ ), obtained health information (17.9% vs. 8.2%,  $p = .047$ ), and attended health education programs (10.5% vs. 1.0%,  $p = .005$ ) than women without cancer. In both groups, women with higher literacy levels outnumbered those with limited literacy.

**Conclusion:** The results indicated that women with breast cancer were more likely to engage in health-promotion activities than women without cancer, and this increased their health literacy levels. The findings could inform interventions involving breast cancer prevention methods.

**Key Words:** Breast neoplasms; Health literacy; Health behavior; Korea; Women

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**Corresponding author:**

Hye-Jin Kim

Department of Nursing, College of  
Medicine, University of Ulsan, 93  
Daehak-ro, Nam-gu, Ulsan 44610,  
Korea.

Tel: +82-52-259-1259

Fax: +82-52-259-1236

E-mail: [kk02khj@ulsan.ac.kr](mailto:kk02khj@ulsan.ac.kr)

## INTRODUCTION

Cancer is the primary cause of death in Korea. The incidence rate for breast cancer is currently the second highest, following thyroid cancer, and continues to increase [1]. In particular, the incidence of breast cancer is the highest in women in their 40s with 185.6 per 100,000, followed by 174.5 in their 50s and 148.3 in their 60s [2].

The survival rate for breast cancer has recently increased to 93.2% because of early diagnosis, advances in treatment methods [1], and a growing interest in the prognoses and quality of life of patients with breast cancer. Cancer survivors are at greater risk than the general population of developing secondary cancers or other diseases such as diabetes and heart disease, and have more physical and psychological symptoms [3]. In particular, obesity and physical activity in breast cancer patients

are associated with cancer recurrence and survival in cancer survivors [4]. As the importance of chronic disease management in breast cancer patients increases, it is important to improve health-promoting lifestyles to prevent disease and improve the prognosis of cancer survivors [5]. In addition, it is necessary for breast cancer patients to fulfill their medical regimen and maintain a healthy lifestyle.

Today, people are required to actively manage their own health, which depends on the availability, accessibility and relevance of health information. Therefore, health literacy is essential for people's health management. Health literacy refers to the ability to acquire, understand, and utilize health information to make appropriate decisions regarding the use of medical services [6,7]. Most health information materials include medical terms and highly professional content, which can be difficult for members of the public to understand [8]. Consequent-

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ly, people with low health literacy levels cannot manage their health properly and experience problems in communication with healthcare providers [9], leading to additional health problems [10]. In addition, health literacy has been associated with obesity, and high health literacy levels could facilitate the maintenance of a healthy weight [11], reduce the recurrence rate of breast cancer, and increase the survival rate [4,12]. Therefore, healthcare providers in the breast cancer field should provide personalized education that accounts for health literacy levels in order to encourage patients to manage their own health.

Health promotion behavior is a process that involves the enhancement of one's own health management ability and control to improve one's health. Moreover, not only do health behavior contribute to a reduction in the incidence of breast cancer by altering extrinsic risk factors [13], but they also reduce the recurrence rate, increase the survival rate, and enhance quality of life for women with breast cancer [14,15]. Therefore, interventions that increase health behaviors are essential for positive prognoses in breast cancer [16].

Numerous studies have examined health literacy in the general public [17] or elderly people [18-20]. In a study of breast cancer patients, a study on cancer health literacy and patient activation related to the health outcome of breast cancer patients [21] reported that cancer health literacy had a positive relationship with education and household income. A study on health literacy and related factors in breast cancer survivors in Norway [22] reported the need for attention and intervention in health literacy. However, to our knowledge, no study has examined health literacy and health behaviors simultaneously in women with breast cancer. The comparison of health literacy levels between women with and without breast cancer, and the provision of appropriate health-promoting education programs, could contribute to the prevention of breast cancer recurrence. Therefore, this study aimed to examine health literacy and health behaviors by comparing health literacy levels between women with and without breast cancer. This study is will provide important data for the development of intervention strategies which are aimed at health behaviors education for women with breast cancer.

## METHODS

### 1. Research design

This was a descriptive study to analyze differences in health literacy and health behaviors between women with and without

breast cancer.

### 2. Participants

Women with and without breast cancer aged between 40 and 69 years, who visited Seoul St. Mary's hospital based in Seoul, Korea between April and June 2017, were invited to participate in the study. Women with breast cancer were recruited from members of the Breast Cancer Patient Association and outpatients. Women without breast cancer were recruited from guardians or volunteers. Inclusion criteria were individuals aged between 40 and 69 years women (ages with the highest incidence of breast cancer)[2]. Exclusion criteria were women, those diagnosed with mental disorder, and alcohol or drug addicts.

The required sample size, calculated using the G\*Power 3.0.10 program [23], with an effect size of .50, a significance level of .05, and power of .09, was 172; however, we recruited 210 participants to account for dropout.

### 3. Instruments

#### 1) Breast cancer-related characteristics

Women with breast cancer provided information regarding clinical stage of cancer, metastasis or recurrence of cancer, current treatment method, and menopause status.

#### 2) The Newest Vital Sign (NVS)

The NVS [24], which was translated into Korean by Kim [8], was used to examine health literacy and health behaviors. The NVS assesses understanding of a nutritional information table and measures number memory, the ability to perform mathematical calculations, the ability to identify harmful ingredients in a product, and the ability to make decisions regarding health behaviors based on the given information. The NVS is a self-administered survey consisting of 14 items pertaining to basic information regarding the participants and six items pertaining to health literacy.

#### (1) General characteristics and health behaviors of participants

The 14 basic information items are used to collect data regarding participants' general characteristics, including age, educational background, occupation, spouse, and monthly household income, as well as health behaviors, including current disease, current medication, annual number of hospital visits, smoking status, weekly alcohol consumption, eating pattern (daily), regular exercise, source of health information and health-promotion method.

## (2) Health literacy

Prior to completion of the six items pertaining to health literacy, participants were presented with a nutrition label from packaged food. Health literacy levels were assessed according to participants' calculation of the amount of food indicated on the label, calories and nutrients, the percentages of nutrients, and knowledge of food allergies. According to the evaluation criteria, health literacy levels were classified as limited (scores of 0-1), somewhat limited (scores of 2-3), and adequate (scores 4-6) [24]. Cronbach's  $\alpha$  for the scale was .76 in Kim's [8] study and .72 in the present study.

## 4. Data collection

Health literacy and health behaviors were analyzed in women with and without breast cancer, using a structured questionnaire. The participants completed the questionnaire in a quiet room without interference. Questionnaire completion took approximately 15-20 minutes, and participants were permitted to view the questions in advance and revise their responses. All 210 questionnaires were returned; however, 18 contained missing data regarding health behaviors and were excluded from the analysis. Therefore, data from 192 questionnaires were analyzed.

## 5. Data analysis

The data were analyzed using SPSS for Windows, version 18.0 (SPSS Inc., Chicago, IL, USA). Differences in characteristics were analyzed using independent groups t-tests, which were performed to compare mean values between the two groups. The basic information obtained regarding health literacy levels and health behaviors was used to calculate means and

standard deviations, and the data were summarized using frequencies and percentages. Health literacy levels and health behaviors were compared between the two groups using chi-square and t-tests. In addition, Fisher's exact test was performed for variables compared using chi square tests. Statistical significance was set at  $p < .05$ .

## 6. Ethical considerations

This study was approved by the Institutional Review Board of the Catholic University of Korea (IRB No. MC17QISI0007) with which the authors were affiliated. The participants received explanations regarding the study objectives and methods. All participants provided informed written consent and no participant was subjected to any discomfort.

## RESULTS

The mean ages of participants with and without breast cancer were 54.58 (standard deviation [SD] = 7.30) and 54.71 (SD = 7.12) years, respectively, and did not differ significantly between the two groups ( $p = .899$ ). Regarding participants' educational backgrounds, there was a larger proportion of participants with a college degree level or above were higher relative to participants with other educational backgrounds; however, and education background did not differ significantly between women with (50.5%) and without (56.7%) breast cancer. The proportion of participants who reported monthly incomes of 990,000 (KRW) or less was 11.6% in women with breast cancer, which was significantly higher relative to the 2.1% observed in women without breast cancer ( $p = .004$ ; Table 1).

With respect to health behaviors, the alcohol consumption

**Table 1.** General Characteristics of Participants (N = 192)

Characteristic	With breast cancer (n = 95)	Without breast cancer (n = 97)	t/ $\chi^2$	p
Age (yr)	54.58 $\pm$ 7.30	54.71 $\pm$ 7.12	-0.13	.899
Educational background				
$\leq$ Middle school	12 (12.6)	8 (8.2)	1.27	.530
High school	35 (36.8)	34 (35.1)		
$\geq$ College	48 (50.5)	55 (56.7)		
Occupation (employed)	33 (34.7)	51 (52.6)	6.21	.013
Spouse (yes)	74 (77.9)	80 (82.5)	0.63	.426
Monthly household income (1,000 KRW)				
$\leq$ 990	11 (11.6)	2 (2.1)	13.14	.004
990 < and 1,990	13 (13.7)	8 (8.2)		
1,990 < and $\leq$ 2,990	25 (26.3)	18 (18.6)		
> 2,990	46 (48.4)	69 (71.1)		

Values are presented as the mean  $\pm$  standard deviation or n (%).  
KRW = Korean won.

rate in women with breast cancer was 14.7%, which was significantly lower relative to the 47.4% observed in women without breast cancer ( $p < .001$ ). In addition, the proportions of participants with and without breast cancer who exercised regularly were 65.3% and 49.5%, respectively ( $p = .027$ ). Moreover, the proportions of participants with and without breast cancer who obtained health information from healthcare providers were 17.9% and 8.2%, respectively ( $p = .047$ ). Furthermore, the proportions of participants with and without breast cancer who attended health education programs were 10.5% and 1.0%, respectively ( $p = .005$ ). Therefore, in terms of these three parameters, women with breast cancer exhibited healthier behavior relative to that observed in those without breast cancer (Table 2).

Regarding breast cancer-related characteristics, clinical staging of breast cancer upon initial diagnosis indicated that most women reported Stage II (49.5%), with Stage IV being the lowest proportion (1.1%). In addition, 15.8% of the women with breast cancer had experienced metastasis or recurrence, 8.4% were receiving chemotherapy, 3.2% were receiving radiation therapy, 49.5% were receiving anti-hormone therapy, and 10.5% were receiving target therapy. Moreover, 89.5% of the women with breast cancer were postmenopausal (Table 3).

The mean NVS score for women with breast cancer was 3.23 ( $SD = 1.80$ ) was significantly lower than to the mean score in women without breast cancer which was 3.37 ( $SD = 1.99$ ). Less than 50% of women with breast cancer correctly answered NVS items on calorie calculation (41.4%), food allergy knowledge (47.4%), calculation of the amount of saturated fat in ice cream (48.4%), and calculation of the percentage of the recommended daily intake of calories from ice cream (49.5%). In women without breast cancer, less than 50% correctly answered NVS items on calculation of the amount of saturated fat in ice cream (44.3%) and calorie calculation (48.5%). Therefore, the overall rates of correct responses for the items pertaining to health literacy levels did not differ significantly between the two groups (Table 4).

With respect to the three levels of health literacy, participants with limited literacy comprised the smallest proportion in both women with (21.0%) and without (20.6%) breast cancer. The proportions of participants with breast cancer who exhibited somewhat limited and adequate literacy levels were 31.6% and 47.4%, respectively. Similarly, in the women without breast cancer, the proportions of participants who exhibited somewhat limited and adequate literacy levels were 30.9% and 48.5%, respectively (Table 4).

## DISCUSSION

In the current study, differences in health literacy in women with and without breast cancer were examined using a structured questionnaire. With respect to the participants' general characteristics, women with breast cancer experienced higher unemployment rates and lower monthly incomes compared to women without breast cancer. These results suggest that the monthly incomes of women with breast cancer had decreased because they found it difficult to continue working during treatment. Indeed, previous research has shown that cancer patients face work and career related restrictions, such as earning income, because they experience disease symptoms, physical side effects, anxiety, depression, loss of employment, and economic loss following treatment [25-27]. Therefore, it is necessary to provide health-related services that address adverse socioeconomic circumstances faced by patients with breast cancer.

Concerning participants' health behaviors, compared to women without breast cancer, women with breast cancer reported consuming fewer alcoholic drinks and greater levels of participation in regular exercise and health education programs. Annual hospital visits and medication use were significantly higher in women with breast cancer relative to those reported by women without breast cancer. These findings likely reflect that fact that the treatment for women with breast cancer included regular hospital visits and medication. According to Nechuta et al. [28], After Breast Cancer Pooling Project reported that weight loss through physical activity was associated with a positive prognosis for breast cancer patients. In a focus group interview study on the analysis of breast cancer patients' perceptions and practices in health care [29], it was reported that they improved their health behaviors compared to before their breast cancer diagnosis in order to regain their health. In addition, there is a high demand for health information, and it has been shown that various efforts are being made to achieve this in addition to hospital care. The results of this study are the same as previous studies that women with breast cancer pay more attention to health behavior and the current results showed that women with breast cancer engaged in these health behaviors. Consequently, women with breast cancer could have been more likely to be exposed to healthcare providers, which could have influenced their acquisition of health information and performance of health behavior. In addition, women with breast cancer could greater access to information regarding health behaviors compared to what is accessible to those with-

**Table 2.** Health Behaviors of Participants (N = 192)

Characteristic	With breast cancer (n = 95)	Without breast cancer (n = 97)	t/ $\chi^2$	p
Current diseases	50 (52.6)	55 (56.7)	0.32	.664
Hypertension	17 (17.9)	19 (19.6)	0.09	.854
Diabetes	6 (6.3)	4 (4.1)	0.47	.535
Arthritis	5 (5.3)	14 (14.4)	4.53	.051
Cardiovascular disease	2 (2.1)	0	2.06	.244
Hyperlipidemia	22 (23.2)	22 (22.7)	0.01	1.000
Kidney disease	1 (1.1)	0	1.03	.495
Others	19 (10.0)	13 (13.4)	1.50	.249
Current medications	69 (72.6)	41 (42.3)	18.08	<.001
Hypertension	14 (14.7)	19 (19.6)	0.79	.446
Diabetes	6 (6.3)	4 (4.1)	0.47	.535
Antineuralgic	0	7 (7.2)	7.12	.014
Annual number of hospital visits	17.83 ± 39.69	5.29 ± 8.71	3.04	.003
Smoking status				
Non-smoker	94 (98.9)	96 (99.0)		.999 <sup>†</sup>
Smoker	1 (1.1)	1 (1.0)		
Weekly alcohol consumption				
None	81 (85.3)	51 (52.6)		<.001 <sup>†</sup>
More than once a week	14 (14.7)	46 (47.4)		
Eating pattern (daily)				
3 times regularly	48 (50.5)	35 (36.1)		.190
2 times regularly	28 (29.5)	32 (33.0)		
3 times irregularly	13 (13.7)	20 (20.6)		
Irregular	6 (6.3)	10 (10.3)		
Regular exercise				
≥ 30 min, ≥ 3 times per week	62 (65.3)	48 (49.5)	4.88	.027
Source of health information				
TV/radio	54 (56.8)	64 (66.0)	1.69	.193
Internet	30 (31.6)	27 (27.8)	0.32	.570
Healthcare provider	17 (17.9)	8 (8.2)	3.94	.047
Friend/acquaintance	15 (15.8)	13 (13.4)	0.22	.639
Newspaper/magazine	17 (17.9)	20 (20.6)	0.23	.632
Specialty publication	8 (8.4)	4 (4.1)	1.51	.219
Health education program	17 (17.9)	12 (12.4)	1.14	.285
Others	1 (1.1)	1 (1.0)		.999 <sup>†</sup>
Health-promotion method				
None	19 (20.0)	23 (23.7)	0.39	.534
Vaccination	23 (24.2)	20 (20.6)	0.36	.551
Health examination	54 (56.8)	54 (55.7)	0.03	.870
Health education program	10 (10.5)	1 (1.0)	8.01	.005
Herbal medicine/nutritional supplements	20 (21.1)	29 (29.9)	1.98	.160
Others	8 (8.4)	0		.003 <sup>†</sup>

Values are presented as the mean ± standard deviation or n (%).

<sup>†</sup>Fisher's exact test.

out breast cancer. In light of these findings, systematic health education and intervention programs for breast cancer prevention and health promotion should be developed to target women without breast cancer, as this population is unlikely to adhere to health guidelines. However, healthcare providers should consider all possible reasons for these findings, rather than assuming that women without breast cancer are unaware of health guidelines.

**Table 3.** Breast Cancer-related Characteristics of Participants (N = 95)

Characteristic	M ± SD or n (%)
Clinical stage of cancer	
0	4 (4.2)
I	33 (34.7)
II	47 (49.5)
III	10 (10.5)
IV	1 (1.1)
Metastasis or recurrence of cancer	15 (15.8)
Current treatment status	
Chemotherapy	8 (8.4)
Radiation therapy	3 (3.2)
Anti-hormone therapy	47 (49.5)
Target therapy	10 (10.5)
Menopausal status	
Premenopausal	10 (10.5)
Postmenopausal	85 (89.5)
Menopause age (yr)	49.53 ± 5.27

M = mean; SD = standard deviation.

The results showed that the proportions of participants with limited health literacy (approximately 20%) did not differ significantly between the two groups, even though women with breast cancer reported lower socioeconomic status, higher unemployment rate, and lower monthly incomes, relative to women without breast cancer. This was similar to the results of a previous study [8], which reported that 18.3% of Korean adults had limited literacy, 24.5% had somewhat limited literacy, and 57.3% had adequate literacy. Meanwhile, the average the NVS score of American breast cancer patients was  $4.7 \pm 1.5$  points, and 79% of the subjects had adequate literacy [30], which was different from the results of this study. Through these results, it was found that there may be differences in health literacy according to race, country, and age. In addition, medical personnel need to plan and implement health education tailored to the level of the individual when conducting health education to patients.

In addition, the results of the current study indicated that, compared to women without breast cancer, women with breast cancer engaged in health-promotion activity more enthusiastically, which enhanced their health literacy levels. Furthermore, the results of previous studies that compared dietary behaviors between women with and without breast cancer showed that women with breast cancer consumed multigrain products, vegetables, seaweed, beans, soybean paste, fermented soybean paste, and yogurt more frequently and rice, meat, processed food, coffee, and milk less frequently relative to women without breast cancer. Taken together, these findings suggest that women with breast cancer often engage in behaviors to improve

**Table 4.** Health Literacy Levels of Participants (N = 192)

Variable	With breast cancer (n = 95)	Without breast cancer (n = 97)	$\chi^2$	p
Proportions of correct answers for health literacy items				
1. Calculation of calories in 1 cup of ice cream	39 (41.4)	47 (48.5)	1.06	.303
2. Calculation of carbohydrates in ice cream	55 (57.9)	66 (68.0)	2.12	.145
3. Calculation of saturated fat in ice cream	46 (48.4)	43 (44.3)	0.32	.570
4. Calculation of percentage of recommended daily intake of calories from ice cream	47 (49.5)	54 (55.7)	0.74	.390
5. Ability to differentiate between ice-cream ingredients that could cause allergy	75 (78.9)	65 (67.0)	3.46	.063
6. Ability to explain reasons	45 (47.4)	52 (53.6)	0.75	.387
Total score (6)	3.23 ± 1.80	3.37 ± 1.99	0.51	.610
Results regarding health literacy items			0.02	.989
Limited literacy	20 (21.0)	20 (20.6)		
Somewhat limited literacy	30 (31.6)	30 (30.9)		
Adequate literacy	45 (47.4)	47 (48.5)		

Values are presented as the mean ± standard deviation or n (%).

their dietary habits [31].

In the current study, some women aged 50 years or older were unfamiliar with nutritional information tables for food products and informed the researchers that they had never purchased food products according to the details provided in these tables. While this incidental piece of information was not collected systematically, it is meaningful as it indicates that education interventions developed for women aged 50 years or older should emphasize the importance of health information in order to increase their health literacy levels and improve dietary habits. A previous study implemented dietary training, whereby patients with breast cancer were provided with food labels to read and interpret. The results showed that the intervention group exhibited reductions in weight, body fat, and waist circumference [32]. In addition, the healthy, low-fat diet in the study, which consisted of low levels of saturated fat and increased fruit and vegetable consumption, helped the participants to maintain a healthy weight [32]. A healthy diet can improve the overall survival rate of breast cancer patients. Therefore, nutritional intervention in breast cancer patients can be considered an integral part of a multimodal treatment approach [33]. Therefore, healthcare professionals should encourage breast cancer patients to obtain knowledge regarding appropriate diet therapy [34], and the identification of patients' health literacy levels and associated difficulties should be prioritized [35]. In addition, it is important to personalize training programs according to patients' individual abilities, with the goal of enhancing their independence in maintaining their health. These training programs could improve patients' health literacy and dietary habits and help them to avoid becoming overweight [36].

The study was subject to some limitations. First, there are limitations in the selection of research participants. In this study, the sample size is small because the data were collected at a tertiary general hospital in Seoul. In addition, participants were those who used a tertiary general hospital, and the level of education of participants was generally high. Therefore, there is a limit to generalization to the vulnerable class with low education level and low access to hospitals. The results of the analysis of participants' health literacy were limited and should be interpreted with caution. There are limitations in interpreting the general characteristics of women with breast cancer because the control for variables that can affect some health behaviors and health literacy is not completely controlled. Therefore, systematic research with larger samples and longitudinal study designs is required. In addition, future re-

search should classify women with breast cancer into subgroups based on their genetic risk, to isolate the effects of intrinsic and extrinsic factors on their cancer status and formulate robust conclusions about the relationships between patients' cancer status and health behaviors.

Second, this study's instruments focused on nutrition, there were limitations in comprehensively measuring the health literacy of women with breast cancer. Therefore, the current results need to be replicated using questionnaires that have been verified systematically with regard to reliability and validity, to not only perform a suitable assessment of health behaviors but also identify various factors pertaining to health literacy in women with breast cancer.

## CONCLUSION

This study was conducted to compare health literacy levels and health behaviors between women with and without breast cancer. The results regarding general characteristics showed that, compared to women without breast cancer, the unemployment rate was higher and monthly incomes were lower in women with breast cancer. Concerning health-related characteristics, women with breast cancer exhibited a lower rate of alcohol consumption and a higher rate of regular exercise, relative to those observed in women without breast cancer. In addition, women with breast cancer were more likely to obtain health information from healthcare providers and attend health education programs, relative to women without breast cancer. In view of these findings, the current study provided meaningful information by ascertaining and comparing health literacy levels and health behaviors between women with and without breast cancer.

Further research is required to evaluate the effects of training programs developed by community-based healthcare professionals to improve health literacy in women aged 40 years or older. Healthcare professionals need to provide specific educational materials for individual access to women and improve health literacy skills to read and interpret health information. Especially in the case of premenopausal women in their 40s, the importance of eating habits should be emphasized because eating habits among health behaviors can affect late menopausal health and breast cancer. Women over the age of 50 should also be informed and supported to practice health problems experienced by postmenopausal women and the importance of healthy eating habits to maintain a normal body mass index (BMI). In addition, since it is important to maintain a normal

BMI in women with breast cancer, additional research is needed to include the participant's BMI as health characteristics and identify the resulting difference in health literacy and health behavior.

## ORCID

Goeun Chung, <https://orcid.org/0000-0003-1021-016X>

Hye-Jin Kim, <https://orcid.org/0000-0001-7088-2692>

## CONFLICT OF INTEREST

The authors declared that no conflict of interest.

## AUTHORSHIP

GEC and HJK contributed to the conception and design of this study; HJK collected data; HJK performed the statistical analysis and interpretation; GEC and HJK drafted the manuscript; GEC and HJK critically revised the manuscript; HJK supervised the whole study process. All authors read and approved the final manuscript.

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