



OPEN Health-promoting lifestyle among Chinese patients with colorectal polyps: a cross-sectional study

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This study aims to investigate the level of health-promoting lifestyles and its influencing factors in Chinese patients with colorectal polyps. A total of 169 colorectal polyps patients from three tertiary care hospitals in Nanchong and Deyang, China, were recruited. Data were collected using the Impact of Health-Promoting Lifestyle Profile-II (HPLP-IIR), Colorectal Cancer Knowledge Questionnaire, Colorectal Cancer Health Belief Scale, the Chinese version of the Health Information Literacy Self-Rating Scale, and a demographic questionnaire. Factors influencing health-promoting lifestyles in patients with colorectal polyps were analyzed using multiple linear regression analysis. The mean HPLP-IIR score was 96.02 ± 14.42 , indicating a moderate level of health promotion. Multiple linear regression analysis revealed that the total score of health information literacy, colorectal cancer knowledge and health beliefs were significantly associated with the total score of health promotion lifestyle in Chinese patients with colorectal polyps ($P < 0.001$), explaining 36.1% of the total variance. The health-promoting lifestyle of colorectal polyp patients was at an intermediate level. Health information literacy, colorectal cancer health knowledge, and colorectal cancer health beliefs were identified as key factors influencing their health-promoting lifestyles. Efforts should focus on improving health information literacy, increasing colorectal cancer health knowledge, and promoting positive health beliefs to establish a better health-promoting lifestyle.

Keywords Colorectal polyps, Health knowledge, Health beliefs, Health-promoting lifestyle, Health information literacy

Colorectal polyps are one of the most important and common risk factors for colorectal cancer. Most chronic diseases, such as malignancies, are preventable by adopting health-promoting lifestyles and other approaches. However, the factors that influence health-promoting lifestyles in patients with colorectal polyps have not been fully studied.

In this study, we investigated the current status of health-promoting lifestyles in patients with colorectal polyps and analyzed their influencing factors. Therefore, interventions to strengthen health knowledge, health beliefs, and health information literacy should be developed to enhance health-promoting lifestyles in patients with colorectal polyps.

The incidence rate of CRC has been steadily increasing year by year and it is now one of the most common cancers worldwide^{1–3}. It is projected that by 2035, there will be an additional 2 million new cases of colorectal cancer and 1.1 million deaths globally. According to statistics published by the National Cancer Center in 2022, the incidence of colorectal cancer in China has gradually increased over the past 30 years⁴. A personal history of intestinal polyps is one of the most significant and common risk factors for colorectal cancer⁵. Literature suggests that approximately 85% to 90% of colorectal cancers develop from intestinal polyps, compared to the general population⁶. According to the expert consensus on early colorectal cancer screening in China, individuals with a history of colorectal polyps are considered part of the high-risk group for colorectal cancer⁷.

Intestinal polyps are a relatively common gastrointestinal disorder, and studies have reported varying prevalence rates, generally ranging from 30 to 60%^{8–10}. It typically takes at least 10 years for intestinal polyps to progress into colorectal cancer¹¹. Early cancer prevention interventions and lifestyle modifications during this period can significantly reduce the incidence of colorectal cancer¹⁰. Studies have shown that 20–70% of colorectal cancer cases and deaths can be prevented by adhering to a healthy lifestyle^{12–14}. Several studies have

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found that maintaining a healthy lifestyle after polypectomy is associated with a reduced risk of colorectal cancer and all-cause mortality^{15,16}. This highlights the important role of lifestyle changes in colorectal cancer prevention. Current research has also demonstrated that the development of intestinal polyps is closely linked to unhealthy lifestyle factors, such as irregular breakfast, low vegetable intake, consumption of unhealthy diets (e.g., red or processed meat), lack of exercise, overweight or obesity, smoking, and alcohol consumption^{17,18}. Regular exercise can reduce the risk of colorectal cancer by 20–30%¹⁹, and appropriate nutrition (e.g., consuming a balanced proportion of vegetables, fruits, cereals, dairy products, and fish) can reduce the risk of colorectal cancer by 30–50%^{20,21}. Fliss-Isakov et al.²² found that adherence to a healthy lifestyle is negatively correlated with the occurrence of colorectal polyps.

Health-promoting behaviors, which encompass social relationships, health responsibilities, self-actualization, stress management, nutrition, and physical activity, are directly linked to disease prevention by maintaining or enhancing health and self-efficacy. These behaviors can be viewed as a means to achieve a better quality of life by managing psychological challenges, reducing stress, and improving interpersonal relationships²³. The Knowledge-Belief-Practice (KABP) theoretical model is widely applied to the promotion of health behaviors. To change behavior, there must be a foundation of knowledge (i.e., information) and belief (i.e., correct beliefs and positive attitudes) as motivation. Through learning, individuals acquire relevant health knowledge and skills, which gradually shape healthy beliefs and attitudes, further contributing to the adoption of healthy behaviors²⁴. Greater knowledge of colorectal cancer risk factors and prevention methods enhances individuals' determination to adopt health behaviors aimed at preventing colorectal cancer²⁵. Furthermore, colorectal cancer-related knowledge enables individuals to hold more positive health beliefs and have fewer negative perceptions about the disease. Omran et al.²⁶ demonstrated that insufficient colorectal cancer knowledge was associated with lower levels of perceived susceptibility and severity, as well as negative health beliefs. In contrast, individuals with stronger health beliefs had higher acceptance of colorectal cancer prevention behaviors and were more likely to adopt them actively^{27,28}. The World Health Organization suggests that information is the pathway to health, and health information literacy is a critical component in promoting public health in the twenty-first century²⁹. The concept of health information literacy (HIL) was first introduced by the American Medical Library Association³⁰. HIL emphasizes the ability to access, evaluate, and use information as a tool to help individuals make better health decisions³¹. Research has shown that a lack of health information literacy hinders access to and understanding of health information, leading to poor health beliefs. It has also been identified as a significant barrier to the adoption of health-promoting behaviors^{32,33}. The aim of this study is to assess the current status and influencing factors of health promotion behaviors in patients with colorectal polyps, and to provide a reference for developing intervention programs to improve health promotion behaviors in these patients.

Materials and methods

Design

This is a cross-sectional study and adhered to the STROBE checklist for observational research.

Participants and procedure

Patients with colorectal polyps attending three tertiary hospitals in Nanchong and Deyang were selected from December 2021 to June 2022. The inclusion criteria were as follows: (1) individuals who had undergone enteroscopy and had a history of intestinal polyps or currently had intestinal polyps; (2) age ≥ 18 years; and (3) no cognitive impairment and normal expressive ability. The exclusion criteria were: (1) those diagnosed with malignancy; (2) those with severe organ damage (e.g., heart, kidney, or lung) in combination with mental disorders or abnormal behavior; and (3) those unwilling to participate in the survey.

All participants provided written informed consent. A structured questionnaire with standardized instructions was completed independently by the patients. The researcher contacted the department director, head nurse, or attending physician of the relevant departments to obtain their support. Following the principles of voluntary participation and informed consent, data were collected through face-to-face questionnaires from study subjects who met the inclusion criteria. The researcher explained the purpose, significance, filling method, and expected duration of the study, invited participants to sign the informed consent, and distributed the questionnaire. The researcher also checked the completed questionnaires on-site.

Sample size

Kendall et al.³⁴ suggested that the study sample size should be 5–10 times of the study factors. This study contains 13 variables, considering the sample loss of 20%, the sample size of this study needs to be at least 156 participants. A total of 169 participants were included in this study.

Data collection

The researcher contacted the department director, head nurse, or attending physician of the relevant departments to obtain their support. Data were collected through face-to-face questionnaires from study subjects who met the inclusion criteria. The researcher explained the purpose, significance, filling instructions, and estimated time commitment for the study, invited participants to sign the informed consent, and distributed the questionnaire. The researcher also checked the completed questionnaires on-site.

Measures

Demographic and medical characteristics

Designed by the researcher after reviewing relevant literature and consulting experts^{35–37}, the content included sex, age, marital status, education level, BMI status, *Household income(monthly)*, occupation, religious beliefs,

residence, commercial insurance, whether a first-degree relative had colorectal cancer, relatives working in the medical field and whether he had received health education on colorectal cancer knowledge.

Health promoting lifestyle profile-II, revise, HPLP-IIR

Health-promoting lifestyle profile II (HPLP-II) is a widely used instrument to evaluate an individual's health behaviors and lifestyles, which showed good validation and reliability in multiple studies^{38,39}. It composes 6 aspects of health promotion behaviors and lifestyles, namely, health responsibility (9 items), physical activity (8 items), nutrition (9 items), spiritual growth (9 items), interpersonal relationships (9 items), and stress management (9 items). Each item is answered with four choices: never, sometimes, often, with a score of 1, 2, 3, and 4. This scale is a revised health-promoting lifestyle scale for the Chinese population obtained by Cao et al.⁴⁰, which was further modified from the HPLP-II. HPLP-IIR was used to measure the level of health-promoting lifestyles of the study participants. The scale consists of 6 dimensions and 40 items, namely, interpersonal relationships (5 items), nutrition (6 items), health responsibility (11 items), physical activity (8 items), stress management (5 items), and spiritual growth (5 items). Each item is answered with four choices: never, sometimes, often, with a score of 1, 2, 3, and 4. The score ranges from 40 to 160, with higher scores indicating higher health-promotion behavior. The Cronbach's alpha coefficient was 0.630–0.810, and the scale retest reliability was 0.690. Cronbach's alpha coefficient for the scale measured in this study was 0.938.

Colorectal cancer knowledge questionnaire

The questionnaire was developed by Ding Zhe⁴¹ in 2013 to assess community residents, with a content validity index of 0.962 and the Cronbach's alpha coefficient of 0.826. The questionnaire consisted of basic knowledge of colorectal cancer (15 entries) and knowledge of screening (6 entries), totaling 21 entries in 2 dimensions. The questionnaire was answered with “yes”, “no”, and “not sure”, with one point for a correct answer and no points for “not sure” and incorrect answers. No points will be given for choosing the “not sure” option or for wrong answers. The total score ranged from 0 to 21, and the higher the score, the higher the knowledge level of the subjects about colorectal cancer. The Cronbach's alpha coefficient of the questionnaire in this study was 0.824.

Colorectal Cancer Health Belief Scale (CCHBS)

This scale was developed by Jacobs⁴² based on the Champion Health Beliefs Scale and was translated into Chinese and validated for reliability by Xiaodan⁴³. The scale consists of six dimensions with 36 entries: perceived susceptibility (5 entries), perceived severity (7 entries), perceived benefits (6 entries), perceived barriers (6 entries), health motivation (7 entries), and self-efficacy (5 entries). The Likert 5-point scale was used, with scores ranging from 1 to 5 on a scale of “completely disagree” to “completely agree,” with the perceived impairment dimension being scored in reverse. Higher scores indicated higher beliefs about the health of CRC. The Cronbach's alpha coefficient for this scale (Chinese version) was 0.881, and the content validity index (S-CVI) was 0.980⁴³. In this study, internal consistency reliability was acceptable ($\alpha = 0.794$).

The Chinese version of the Health Information Literacy Self-rating Scale (HILSS)

The scale was developed by the Chinese scholar Wang et al.⁴⁴, and includes a comprehensive consideration of the Chinese population in terms of information access and information behavior characteristics. It includes 29 items and five domains: health information consciousness (four items, HIC), health information access (four items, HIS), health information evaluation (five items, HIE), health information applications (four items, HIA), and health information morality (four items, HIM). The Likert scale was used, with entries assigned rating values quantified in the [0, 1] range for a total of five levels. The higher the total score, the higher the individual's level of health information literacy of the individual. The results were processed on a percentage scale, with a score above 60 indicating a competent level of health information literacy⁴⁴. The Cronbach's alpha coefficient for this scale in this study was 0.837.

Ethics and consent statement

The study was approved by the Ethics Committee of the Affiliated Hospital of North Sichuan Medical College (approval number: 2020ER186-1), and all methods were performed by the relevant guidelines and regulations. The data were anonymous, and coded using participant-created codes.

Statistical analysis

We analyzed the data collected using SPSS25.0 and set the significance level 05 for all the analyses. We used descriptive statistics to identify demographic and colorectal cancer knowledge, health beliefs, health-promoting lifestyles, and health information literacy, such as frequency, percentage, mean, and standard deviation. Second, one-way ANOVA or t-test was used to assess whether different categories were different for health-promoting lifestyles. Furthermore, we studied the relationships between colorectal cancer knowledge, health beliefs, health-promoting lifestyles, and health information literacy using Pearson's correlation. Factors influencing health-promoting lifestyle in patients with colorectal polyps were analyzed using multiple linear regression analysis. Multiple linear regression analyses were performed using the total health promotion lifestyle score as the dependent variable and the eight variables with statistically significant differences in the one-way analysis as well as the correlation analysis as the independent variables.

Results

Demographic characteristics and comparison of total health-promoting lifestyle scores of colorectal polyp patients with different characteristics

The characteristics of the sample are listed in Table 1. In the 169 respondents in this study, the mean age of patients was 53.69 (SD = 12.26) years. There were 118 males (69.8%) and 51 females (30.2%), and 165 married colorectal polyps patients (97.6%). The normal test results and scores of the variables are shown in Table 2. For each of the observed variables, the kurtosis and skewness values were between -1 and 1; therefore, the sample can be considered to have a normal distribution.

Colorectal polyp patients in this group were grouped according to gender, age, literacy, occupation, marital status, BMI level, place of residence, religion, per capita monthly family income, whether they bought commercial insurance, whether their first-degree relatives had a history of colorectal cancer, whether they had relatives who worked in the field of medicine, and whether they had received health education on colorectal cancer knowledge, and their health-promoting lifestyle total scores were compared. The results of One-way ANOVA or t-test showed that Patients with intestinal polyps from higher household income had higher healthy lifestyle than those from lower household income. Patients with intestinal polyps with higher education level had a higher health promoting lifestyle than those with low education level. Patients with colorectal cancer have received colorectal knowledge health education and their health-promoting lifestyle is higher than those who

	Variable	n	Percent	HPLP-IIR Mean \pm SD	t/F	P
Whether a first-degree relative had colorectal cancer	Yes	22	13.0	91.86 \pm 18.74	-1.455	0.148
	No	147	87.0	96.64 \pm 13.63		
Sex	Male	118	69.8	95.92 \pm 14.85	-0.138	0.892
	Female	51	30.2	96.25 \pm 13.51		
Age (years)	≤ 40	26	15.4	95.73 \pm 15.18	-0.112	0.991
	> 40	143	84.6	96.07 \pm 14.33		
Marital status	Unmarried	4	2.4	95.00 \pm 14.58	-0.143	0.886
	Married	165	97.6	96.04 \pm 14.46		
Education	Primary school and below	49	29.0	93.83 \pm 12.11	5.304	0.002**
	Junior High School	53	31.4	93.32 \pm 15.87		
	High school	32	18.9	94.78 \pm 11.55		
	University and above	35	20.7	104.31 \pm 14.95		
BMI status	underweight	4	2.4	108.75 \pm 12.84	1.387	0.249
	Normal	89	52.7	96.00 \pm 14.28		
	Overweight	57	33.7	94.49 \pm 14.51		
	Obesity	19	11.2	98.05 \pm 14.66		
Household income(monthly)	< 1500 RMB	44	26.0	92.25 \pm 15.17	2.522	0.043*
	1500–3000 RMB	58	34.3	96.01 \pm 13.06		
	> 3000–4500 RMB	35	20.7	95.82 \pm 14.43		
	> 4500–6000 RMB	15	8.9	97.40 \pm 15.78		
	> 6000RMB	17	10.1	105.00 \pm 13.07		
Occupation	Employees of government organs and institutions	28	16.6	103.07 \pm 12.85	3.537	0.002**
	Farmers	64	37.9	92.81 \pm 15.19		
	Enterprise plant and mine workers	28	16.6	98.17 \pm 12.58		
	Freelancer	12	7.1	90.91 \pm 12.85		
	The retired workers	23	13.6	100.17 \pm 12.56		
	Other professionals	14	8.3	89.85 \pm 12.06		
Religious beliefs	Has	7	4.1	94.14 \pm 24.35	-0.351	0.726
	No	162	95.9	96.10 \pm 13.96		
Residence	Rural	62	36.7	93.16 \pm 15.63	-1.980	0.049*
	City	107	63.3	97.68 \pm 13.47		
Commercial Insurance	Yes	25	14.8	100.00 \pm 17.34	1.499	0.136
	No	144	85.2	95.33 \pm 13.81		
Relatives working in the medical field	Yes	43	25.4	98.97 \pm 13.05	1.561	0.120
	No	126	74.6	95.01 \pm 14.78		
Health education about colorectal cancer	Yes	24	14.2	101.50 \pm 11.44	2.026	0.044*
	No	145	85.8	95.11 \pm 14.69		

Table 1. The participants' general demographic and characteristics (N = 169). * $p < .05$. ** $p < .01$; N, Number; HPLP-IIR, Health promoting lifestyle profile-II, revise; SD, standard deviation.

Variable	Question number	Minimum	Maximum	Total scores (Mean ± SD)	Mean item score (Mean ± SD)
HPLP-II R	40	41	132	96.02 ± 14.42	2.40 ± 0.36
Colorectal Cancer Knowledge Questionnaire	21	0	18	9.38 ± 4.36	0.44 ± 0.21
CCHBS	36	68	153	123.12 ± 2.96	3.42 ± 0.32
HILSS	29	7.95	23.16	15.85 ± 2.97	0.54 ± 0.10

Table 2. Descriptive statistics of HPLP-II R, Colorectal cancer knowledge questionnaire, CCHBS, and HILSS (N = 169). N, Number; HPLP-IIR, Health-promoting lifestyle profile-II, revise; CCHBS, Colorectal Cancer health belief scale; HILSS, The Chinese version of the health information literacy self-rating scale; SD, standard deviation.

Variables	B	SE	β	t	p values	95%CI
Constant	8.760	13.101	—	0.669	0.505	−17.118 to 34.639
Health information literacy	1.695	0.352	0.349	4.821	0.000**	1.001 to 2.389
Colorectal cancer knowledge	0.699	0.256	0.212	2.737	0.007**	0.195 to 1.204
Health beliefs	0.393	0.083	0.319	4.738	0.000**	0.229 to 0.557
Education	−2.266	1.844	−0.110	−1.229	0.221	−5.908 to 1.376
Household income(monthly)	0.305	1.077	0.026	0.283	0.777	−1.823 to 2.433
Residence	2.238	2.413	0.075	0.928	0.355	−2.528 to 7.004
Occupation						
Farmers	Reference					
Employees of government organs and institutions	1.305	3.607	0.034	0.362	0.718	−5.819 to 8.430
Enterprise plant and mine workers	−0.023	3.210	−0.001	−0.007	0.994	−6.363 to 6.318
Freelancer	−6.960	4.122	−0.124	−1.689	0.093	−15.102 to 1.182
The retired workers	1.745	3.414	0.042	0.511	0.610	−4.998 to 8.488
Other professionals	−5.981	3.721	−0.115	−1.607	0.110	−13.331 to 1.370
Health education about colorectal cancer	3.183	2.804	0.077	1.135	0.258	−2.356 to 8.722

Table 3. Multivariate analysis of health promotion lifestyle of colorectal polyps patients. R² = 0.406, adjusted R² = 0.361, F = 8.893, P < 0.001. B, coefficient of regression; SE, standard error; β, standardized regression coefficient. All variables listed in this table were included in the multivariate linear regression model.

had no colorectal knowledge health education. Working for the government, the urban residential colorectal polyps in patients with health promoting lifestyle is better than that of farmers, rural residential health promoting lifestyle for patients with colorectal polyps (P < 0.05). See Table 1.

Scores of health-promoting lifestyle, health knowledge, health beliefs and health information literacy of colorectal polyp patients

The mean health promotion lifestyle score of colorectal polyps patients was 96.02(SD=14.42). The mean colorectal cancer knowledge score was 15.85 (SD = 2.97). The mean CCHBS score was 123.12 (SD] = 2.96). The mean HILSS score was 15.85 (SD = 2.97) (Table 2).

Correlations among health promotion lifestyle, colorectal cancer knowledge, health beliefs, and health information literacy

Correlation analysis showed that health promotion lifestyle was positively associated with health beliefs (r=0.422, p<0.01), colorectal cancer knowledge(r=0.439, p<0.01) and health information literacy(r=0.460, p<0.01). Health information literacy had a significant positive association with health beliefs (r = 0.337, p < 0.01) and colorectal cancer knowledge(r=0.360, p<0.01). Colorectal cancer knowledge had a significant positive association with health beliefs (r = 0.422, p < 0.01).

Multivariate analysis of health promotion lifestyle of colorectal polyps patients

In the analysis of health promotion lifestyle (Table 3), the higher total score of health information literacy (β [95% CI] = 0.349[1.001–2.389], P<0.001), colorectal cancer knowledge (β [95% CI] = 0.212[0.195–1.204], P<0.007) and health beliefs (β [95%CI] = 0.319[0.2290–0.557], P<0.001) were significantly associated with the higher total score of health promotion lifestyle.

Discussion

The results of this study showed that the health promotion lifestyle score of colorectal polyp patients was 96.02 ± 14.42, which is considered to be at an intermediate level when compared to the midpoint of the total scale score (100.00). In China, when individuals' health issues have minimal impact on their work and daily

lives, they often do not perceive themselves as being sick⁴⁵. As a result, their awareness of maintaining health is weak, and they are less likely to proactively seek health-related knowledge or engage in health-promoting behaviors. The level of education of the participants in this study was relatively low, with 79.3% having a high school education or lower. Furthermore, 85.8% of the participants had not received any health education on colorectal cancer, leading to limited health knowledge and a restricted ability to translate this knowledge into health-related actions. Consequently, their health promotion lifestyle was at a medium level.

Health information literacy has been found to be associated with the health promotion lifestyle of patients with colorectal polyps ($\beta=0.349$, $p<0.001$). This study found that patients with colorectal polyps who had a higher level of health information literacy demonstrated better health promotion lifestyles. Individuals with inadequate health information literacy often rely on a limited number of sources for health information and struggle to obtain useful cancer prevention information from available materials, resources, or discussions⁴⁶. On the other hand, patients with colorectal polyps who possess health information literacy are better able to recognize the value of health information and actively seek knowledge related to colorectal cancer. Strong health information searching skills enable them to explore colorectal cancer-related health knowledge from multiple sources, critically evaluate the information, and apply it to their health behaviors. The more effectively they can comprehend and evaluate colorectal cancer-related health information, the more likely they are to develop positive health beliefs and adopt behaviors that promote and maintain their health⁴⁷.

Colorectal cancer health knowledge has been found to be associated with the health promotion lifestyle of patients with colorectal polyps ($\beta=0.212$, $P=0.007$). This study found that patients with colorectal polyps who had a higher level of health knowledge exhibited better health promotion lifestyles, which is consistent with the findings of Song et al.⁴⁸ and Adamowicz et al.⁴⁹ in their studies of colorectal cancer patients. According to the "Knowledge-Belief-Action" theory, accurate knowledge is a prerequisite for the adoption of any positive health behaviors. Health-related knowledge can lead to positive changes in lifestyle or health behaviors, which, in turn, fosters the development of healthy habits⁵⁰. Therefore, it is crucial to provide colorectal polyp patients with accurate information on lifestyle changes to prevent colorectal cancer. However, in practice, most healthcare providers are unable to deliver personalized education that meets the specific needs of each colorectal polyp patient due to limitations in time, resources, and personnel.

Colorectal cancer health beliefs have been found to be associated with the health promotion lifestyle of patients with colorectal polyps ($\beta=0.319$, $P<0.001$). This study found that patients with colorectal polyps who had higher health beliefs exhibited better health promotion lifestyles, which is consistent with the findings of studies by Liu et al.⁵¹, who investigated colorectal cancer patients with permanent intestinal stomas, and Jensen et al.⁵², who studied cancer survivors. Health beliefs refer to the conceptual systems held by individuals regarding disease prevention, health maintenance, and striving for an optimal life state. These beliefs shape the concepts of healthy living that individuals adhere to⁵³. The Health Belief Model (HBM) is a psychological model that explains individuals' health and disease-related beliefs and predicts health behaviors. It emphasizes the role of perceptions (subjective judgments) in the formation and maintenance of health behaviors and includes six dimensions: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, health motivation, and self-efficacy⁵⁴. Health beliefs form the foundation of health promotion behaviors and facilitate the adoption of these behaviors⁵⁵. Patients with colorectal polyps who hold stronger health beliefs are more likely to perceive the severity and susceptibility to colorectal cancer, recognize the effectiveness of preventive measures, understand the barriers involved, and possess sufficient motivation and self-efficacy to adopt health-promoting lifestyles.

Some factors (e.g., occupation, education, and income) were not significantly related to health promotion lifestyle in this study, which is inconsistent with the findings of Rêgo et al. and Wan et al.^{56,57}. In general, occupation, income, and education level are correlated⁵⁸. Education, occupation, and income are key indicators of an individual's socioeconomic status. One possible explanation for this discrepancy is that 85.8% of patients with colorectal polyps in this study did not receive health education on colorectal cancer. The results of an intervention study by Hatami et al.²⁸ found that multimedia-based health education could improve people's dietary beliefs and healthy eating behaviors in the context of colorectal cancer prevention.

It is recommended that relevant departments and personnel utilize information technology and other channels to provide colorectal cancer-related knowledge and specific health behavior skills, ensuring high-quality access to health information (such as public accounts and medical websites). Popular science education on information retrieval and network searching should be promoted, along with efforts to accelerate the construction of user-friendly medical network information retrieval systems. This will enhance the awareness and ability of patients with colorectal polyps to access health information and help them obtain effective health guidance. Health education can be carried out through health knowledge expos, inflatable colon models, and psychological interventions⁵⁹. Professional doctors should visit communities, enterprises, and rural areas to explain colorectal cancer health knowledge in a more accessible way. Based on the Health Belief Model, targeted interventions should be developed to educate patients with colorectal polyps about the severity and susceptibility of the disease. Additionally, patients who have benefited from self-management programs should be regularly invited to share their successful experiences, and mindfulness training should be used to enhance their self-efficacy. Healthcare providers should ensure that patients with colorectal polyps have convenient access to information and resources, and encourage family members to support each other in improving health motivation.

Limitations

Due to time and resource constraints, this study only included colorectal polyp patients from three tertiary care hospitals, and did not incorporate studies from community settings, which limits the representativeness of the sample. Furthermore, clinicopathologic characteristics, such as the size and number of colorectal polyps, were not collected, which restricts the ability to assess how these factors influence the health-promoting lifestyle.

of patients with different clinical profiles. Additionally, as this was a cross-sectional study, it does not provide insights into the dynamics of health promotion behaviors over time among patients with colorectal polyps.

Conclusion

In conclusion, the health promotion lifestyle of colorectal polyp patients still requires continuous improvement. Additionally, medical staff should implement targeted interventions to enhance the health promotion lifestyle of colorectal polyp patients with low health information literacy, limited knowledge about colorectal cancer, and weaker health beliefs.

Data availability

Data is provided within the manuscript or supplementary information files.

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Author contributions

All authors had a substantial contribution to the manuscript. JRZ Conceptualisation, Study design, Data collection, Data analysis, Data interpretation, Writing original draft, Review and editing, Final approval; YJL: Conceptualisation, Study design; LH and XLZ: Study design, Review and editing; FY, YFW and YL: Study design, Review and editing.

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Declarations

Competing interests

The authors declare no competing interests.

Additional information

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