ORIGINAL RESEARCH ARTICLE

Exploration of Risk Factors for Hemorrhoids in the Zhuang Population of Guangxi: A Case-Control Study

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ABSTRACT

Background The prevalence of hemorrhoids in Chinese urban and rural residents is very high. However, the factors affecting the occurrence of hemorrhoids are not very clear, which is disadvantageous to the prevention of hemorrhoids. **Objective:** To explore the external environment and behavioral influencing factors of hemorrhoidsin the Zhuang population of Guangxi, China, and provide a basis for the prevention of hemorrhoids.

Methodology: A case-control study method was used to collect hemorrhoid patients and non-hemorrhoid patients from the same hospital and department as the case group and control group. A self-made questionnaire was used to investigate the education level, family income, alcohol consumption, diet, taste, work position, and other information of the two groups of patients, and logistic regression was used to analyze the correlation between various exposure factors and hemorrhoids.

Result: A total of 11 variables were analyzed in this study, and it was found that education level, constipation, chronic gastritis, and dietary taste were associated with hemorrhoids (OR=2.02, 95% CI: 1.16, 3.52; OR=2.70, 95% CI: 1.50, 4.87; OR=1.96, 95% CI: 1.14, 3.36; OR=0.50, 95% CI: 0.28, 0.89).

Conclusion Education level, constipation, and chronic gastritis can increase the risk of hemorrhoids, while bland diet can reduce the risk of hemorrhoids.

Keywords: Hemorrhoids, Risk factors, Zhuang Population

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INTRODUCTION

Hemorrhoids are one of the most common anorectal diseases, whose prevalence, multiplicity are in consensus, and there is a saying among Chinese people that "nine out of ten people have hemorrhoids". Data showed that the prevalence of anorectal disease was 50.10% in urban and rural residents of China, among whom the prevalence of hemorrhoids was up to 49.14%, with adults predominating.[1]

Although hemorrhoids are not a serious and fatal disease, their high incidence often leads to symptoms such as rectal bleeding, perianal swelling, itching, and pain, causing a lot of pain and distress to patients. Therefore, it is necessary to search for the influencing factors of hemorrhoids and take corresponding preventive measures. However, due to differences in research regions and populations, there are currently diverse research results on the factors influencing the incidence of hemorrhoids. For example, some people believe that constipation and mental stress are common causes of hemorrhoids[2], but diarrhea has also been proven to be a risk factor for the occurrence of hemorrhoids[3]; In addition, many dietary factors, including a low fiber diet, spicy foods, and alcohol intake, are also associated with hemorrhoids, but the reported data is inconsistent.[4]

The Zhuang ethnic group is a minority group in China, mainly living in Guangxi Zhuang Autonomous Region with a population of approximately 15 million. The Zhuang ethnic group enjoys drinking alcohol, eating spicy food, and pickled meat and vegetables in their dietary habits, which may be risk factors for hemorrhoids.[5] However, there is currently no relevant research on hemorrhoids in the Zhuang population. If the factors that affect hemorrhoids can be identified through scientific research, corresponding measures can be taken in the population, such as changing external environmental factors or correcting unfavorable behavior habits, in order to achieve the effect of preventing hemorrhoids and reduce the pain and troubles that hemorrhoids bring to the Zhuang population. To achieve this goal, this study intends to use a case-control study method to explore the risk factors for hemorrhoids in the Zhuang population of Guangxi.

METHODOLOGY

Study population and inclusion and exclusion criteria: The study population was Guangxi Zhuang people in China. All participants were local residents of the Zhuang ethnic group in Guangxi, who underwent colonoscopy at the Spleen and Stomach Department of the First Affiliated Hospital of Traditional Chinese Medicine in Guangxi. The selection and exclusion criteria for case and control subjects are as follows. In the case group, according to the Chinese guidelines for the diagnosis and treatment of hemorrhoids (2020)[6], local Zhuang hemorrhoids patients living in Guangxi were selected, including patients with internal hemorrhoids, external hemorrhoids and mixed hemorrhoids, aged 18-65 years. The control group study subjects were selected from Zhuang non hemorrhoid patients, and the age requirement is 18-65 years old. Patients with birth defects, colorectal cancer and other malignant tumors, pregnant women and lying-in women were excluded. Patients with serious illness who are not suitable for the study. Minors under the age of 18 and the elderly over the age of 65.

Calculation of sample size: The highest test efficiency is obtained when the sample content is equal between cases and controls. Therefore, the sample size estimation method in this study when the number of cases and the number of controls is equal in non-matched design was used to estimate the sample size needed for the study, which was calculated using EpiCalc 2000 software. Based on the relevant literature[7], the OR was set at 2.12, the proportion of exposed in the control group was 22.6%, the significance was 0.05 (two-sided test), and the power was 90%, and finally, we calculated 179 in the control and case groups, respectively, with a sample size of 358 cases. Because hemorrhoids may be a multifactorial and complex disease, considering confounding factors, the actual sample content should increase by about 10% based on ideal estimation, so about 200 cases and controls were included in this study.

Data collection tool and methods: These data were collected through face-to-face interviews and medical record reviews. The interview was conducted after the patient's colonoscopy examination. Two trained medical master's students and one chief physician participated in data collection. This survey questionnaire was compiled by the researchers themselves after reviewing peer-reviewed literature on risk factors for hemorrhoids. The questionnaire includes the following three parts. The first part was basic personal information of the research subject, including current address, gender, age, nation, education level, family income. The second part is about the behavioral habits of the research subjects, including drinking habits, dietary habits, physical activity habits, and work positions. The third part was about the digestive system diseases of the research subjects, including chronic diarrhea, chronic gastritis, constipation. Higher education refers to the education of junior college or above; Family income refers to the average monthly income of the whole family; Drinking more than 50 ml each time, more than once a month on average, is considered to be drinking; Regular eating was defined as eating more than three times a week, while occasional eating was defined as eating less than two times a month; Eating more meat than vegetables in each meal is defined as mainly meat based, on the contrary, it is defined as vegetarian oriented, and eating as much meat as vegetables is defined as uniformity of meat and vegetables; Taste is determined by the subjective opinions of the respondents; Working in a sitting position for

more than 4 hours a day is defined as working in a sitting position; Activities with more rapid breathing than normal, at least three times a week, at least 10 minutes each time, are defined as high strength physical activity; Moderate strength physical activity refers to the activity that takes more effort to breathe than normal, at least 3 times a week, at least 10 minutes each time; Low strength physical activity mainly refers to walking, including walking at work, at home, from somewhere to somewhere, entertainment, games or leisure. Constipation refers to poor defecation at least in the past 3 months, which is characterized by less frequent defecation, difficult defecation, or both. Chronic gastritis was determined according to the history of the subjects.

Data quality control: Prior to actual data collection, a pre-test was conducted on 5% of the sample size. Necessary modifications have been made based on the results of pre-testing. The researchers conducted a one-day training session for data collectors and supervisors on goals, interviews, and medical record data collection. Researchers and supervisors closely monitor, inspect, and review the data to ensure its clarity and completeness.

Data processing and analysis: Review, clean, and code the questionnaire, input Epidata version 4.2.2, and then export the data to SPSS version 23.0 for analysis. Calculate descriptive statistical data such as frequency and distribution for the case group and control group, as well as summary statistical data such as mean and standard deviation. Use independent sample t-test to test the continuous variables of case and control for analysis. Use chi-square analysis to test the Categorical variable, and use multivariate logistic regression analysis models to determine the independent determinants of hemorrhoids. A p-value <0.05 is considered statistically significant.

Ethical approval: This research has been approved by the Ethics Committee of Guangxi Medical University (No.0168 of 2022) and the Ethics Committee of Mahasarakham University (208-075/2023). Participants will be informed of the research objectives, risks, and methods, and their participation will be voluntary. In order to maintain ethical principles, the information of all participants must be kept confidential.

RESULTS

Socio-demographic characteristics: A total of 400 participants were interviewed, with a response rate of 100%. The 400 subjects were all Zhuang people, 148 males and 252 females. Among them, there were 125 females (62.5%) and 75 males (37.5%) in the case group, 127 females (63.5%) and 73 males (36.5%) in the control group. The average (± SD) ages of the case and control groups were 30.4 ± 5.6 and 29.6 ± 4.6 years, respectively. The oldest was 60 years old, the younger was 18 years old. There is no statistically significant difference in gender and age between the two groups (All P>0.05).

Table 1: The distribution characteristics of each factor in the research object

Variables	Cases (%) (n=200)	Controls (%) (n=200)
Education level		
higher education	121 (60.5)	93 (46.5)
Non higher education	79 (39.5)	107 (53.5)
Family income (CNY/month)		
>4000	128 (64.0)	105 (52.5)
≤4000	72 (36.0)	95 (47.5)
Drinking situation		
Yes	56 (28.5)	61 (30.5)
No	143 (71.5)	139 (70.6)
Dietary habit		
Mainly meat based	73 (36.5)	59 (29.5)
Vegetarian oriented	28 (14.0)	36 (18.0)
Uniformity of meat & vegetables	99 (49.5)	105 (52.5)
Spicy food		
Eating regularly	59 (29.5)	56 (28.0)
Occasionally eat	92 (46.0)	96 (46.0)
Not eating	49 (24.5)	48 (24.0)
Pickled food		
Eating regularly	15 (7.5)	16 (8.0)
Occasionally eat	144 (72.0)	142 (71.0)
Not eating	41 (20.5)	42 (21.0)
Dietary taste		
Salty	88 (44.0)	87 (43.5)
bland	64 (32.0)	82 (41.0)
moderate	48 (24.0)	31 (15.5)
Working position		
sitting position	99 (45.5)	73 (36.5)
Non sitting posture	101 (50.5)	127 (63.5)
Physical activity		
high strength	24 (12.0)	25 (12.5)
Medium strength	53 (26.5)	40 (20.0)
Low strength	123 (61.5)	135 (67.5)
Constipation		
Yes	44 (22.0)	20 (10.0)
No	156 (78.0)	180 (90.0)
Chronic gastritis		
Yes	48 (24.0)	28 (14.0)
No	152 (76.0)	172 (86.0)

Note: P<0.05 means the difference is statistically significant

The distribution characteristics of factors among research subjects: The questionnaire investigation surveyed the education level, family income, alcohol consumption, dietary habits, job position, sports activities, and other factors of the respondents. The distribution of various factors in the population is shown in table 1.

Binary logistic regression analysis results of various factors: Perform binary logistic regression analysis with hemorrhoids as the dependent variable and each factor as the independent variable. the crude ratio (unadjusted OR value) of each factor was calculated in the unadjusted binary logistic regression, the results showed education level, household income, work position, constipation, chronic gastritis and bland dietary taste were associated with hemorrhoids. And then these six factors were introduced

into the model to calculate the adjusted OR value of each factor. After adjusting for confounding factors, household income and work position were not associated with hemorrhoids. However, after adjusting for confounding factors, it was found that age was statistically correlated with hemorrhoids and was an independent risk factor for hemorrhoids. In the variable of dietary taste, both in the uncorrected binary logistic regression model and the model corrected for confounding factors, the results showed that it can reduce the risk of hemorrhoids (Table 2).

Table 2: Odds ratio and 95% confidence interval of binary logistic regression for each factor

Variable	Unadjusted OR (95%CI)	*P* value	Adjusted OR* (95%CI)	*P** value
High education (ref: Low)	1.76 (1.19, 2.26)	0.005	2.02 (1.16, 3.52)	0.013
High family income (ref: Low)	1.54 (1.03, 2.29)	0.034	1.01 (0.60, 1.68)	0.983
Working position (ref: Non sitting)	1.64(1.09, 2.44)	0.015	1.42 (0.91, 2.23)	0.124
Drinking situation (ref: No)	1.06 (0.70, 1.60)	0.796	1.35 (0.84, 2.17)	0.213
Dietary habit				
Vegetarian oriented(ref)	1		1	
Mainly meat based	1.60 (0.87, 2.90)	1.300	1.82 (0.99, 3.47)	0.068
Uniformity of meat and vegetables	1.21 (0.69, 2.13)	0.504	1.24 (0.67, 2.29)	0.489
Spicy food				
Not eating(ref)	1		1	
Eating regularly	1.03 (0.60, 1.77)	0.909	0.96 (0.53, 1.75)	0.901
Occasionally eat	0.94 (0.58, 1.53)	0.801	0.87 (0.51, 1.47)	0.602
Pickled food				
Not eating(ref)	1		1	
Eating regularly	0.96 (0.42, 2.19)	0.924	1.07 (0.44, 2.58)	0.886
Occasionally eat	1.04 (0.64, 1.69)	0.879	1.22 (1.72. 2.07)	0.465
Dietary taste				
moderate(ref)	1		1	
Salty	0.65 (0.38, 1.12)	0.122	0.62 (0.35, 1.09)	0.099
bland	0.50 (0.29, 0.80)	0.016	0.50 (0.28, 0.89)	0.019
Physical activity				
Low strength(ref)	1		1	
high strength	1.05 (0.57, 1.94)	0.867	0.95 (0.49, 1.83)	0.870
Medium strength	1.45 (0.90, 2.43)	0.124	1.33 (0.80, 2.21)	0.279
Constipation (ref: No)	2.54 (1.43, 4.49)	0.001	2.70 (1.50, 4.87)	0.001
Chronic gastritis (ref: No)	1.94 (1.16, 3.25)	0.012	1.96 (1.14, 3.36)	0.014

Note: *It refers to the corrected OR and P values for education level, family income, work position, constipation, and chronic gastritis. P<0.05 means the difference is statistically significant.

DISCUSSION

At present, there are various research results on the risk factors of hemorrhoids, and many external factors may lead to the occurrence of hemorrhoids. This study adopts a case-control research method and found that education level, bland diet, constipation, and chronic gastritis are associated with the risk of hemorrhoids. Among them, education level, constipation, and chronic gastritis increase the risk of hemorrhoids, while bland diet can reduce the risk of hemorrhoids.

The correlation between education level and hemorrhoids: Education level refers to the level of educational knowledge and abilities acquired by individuals through schools, training institutions, social experience, and other means. Education level is an important indicator of human civilization progress and a crucial condition for participating in social and economic development. In modern society, individuals with higher levels of education generally have more opportunities and advantages in career development, quality of life, and social status. Personal occupation, quality of life, and behavior are related to many diseases, and harmful occupational factors and unhealthy lifestyle behaviors are also risk factors for various diseases.

People with high levels of education are generally engaged in occupations primarily focused on mental labor. Most of these professions require prolonged sitting and minimal physical activity. Long term sitting without movement can slow down gastrointestinal peristalsis, leading to abdominal distension and constipation[8], which has always been considered a risk factor for hemorrhoids. On the other hand, prolonged sitting may lead to slow venous return, stasis of blood in the rectal and anal veins, and may cause venous valve dysfunction, leading to obstruction of venous return and prolonged congestion and dilation of venous plexus[9], ultimately resulting in varicose veins and hemorrhoids. In univariate analysis, this study also found a correlation between a sitting work posture and the risk of hemorrhoids, but the correlation disappeared after adjusting for the factor of education level. This is likely due to the fact that sitting posture is an intermediate factor in the association between education level and hemorrhoids, to the extent that when education level is introduced into the model, its association with hemorrhoids is included in the factor of education level.

On the other hand, compared to those with lower levels of education, those with higher levels of education also have relatively higher economic income. And a higher income level means they have a higher level of consumption. Therefore, they tend to consume high levels of polished rice, noodles, and meat in their diet, while the intake of coarse grains with high dietary fiber is relatively reduced, which slows down food digestion, reduces gastrointestinal motility, and easily causes bloating and constipation[10], leading to hemorrhoids. In the factor analysis of this study, it was found that higher household income was also associated with the occurrence of hemorrhoids compared to lower household income. However, similar to the sitting position, after adjusting for education level, the correlation between higher family income and hemorrhoids disappeared. This also means that family income is an intermediate factor in the association between education level and hemorrhoids.

The correlation between dietary taste and hemorrhoids: Diet plays a crucial role in maintaining life, promoting health, and prolonging lifespan. A reasonable diet can provide the body with the nutrients it needs, such as protein, fat, carbohydrates, vitamins, and minerals, to maintain normal body function, enhance the body's immunity and resistance. In addition to reasonable dietary combinations, dietary taste is also related to certain diseases.

A person's dietary taste is related to taste, which is mediated by receptor cells in the taste buds on the dorsal and posterior surfaces of the tongue, as well as on the surface of the oral and pharyngeal epithelium.[11] Taste receptor cells are also present in the intestine.[12] Saliva plays a crucial role in stimulating food contact with receptor cells. They detect chemical signals that generate taste and stimulate the release of neurotransmitters onto incoming nerve fibers, thereby transmitting signals to the brainstem.

Taste plays a crucial role in food selection, whether one likes or dislikes food for the first time. There are five types of taste, namely bitter, salty, sour, sweet, and fresh.[13] People believe that sweetness can detect high-energy, high calorie, and pleasurable substances, while bitterness perception can lead to avoidance or rejection of toxic or toxic substances. Controlling the intake of Na+ through saltiness is crucial for maintaining water balance and blood circulation in the body.[14] Freshness can recognize amino acids, especially glutamic acid.[15] Sourness is an important sensory input that affects the intake of acidic food sources.[16]

The latest developments in the field of taste physiology have elucidated the roles of different basic taste patterns and their impact on health and disease.[17] Current research on taste and disease has confirmed that taste is closely related to the risk of certain diseases. For example, studies have shown a relationship between obesity and sweetness[18,19], while saltiness is associated with hypertension. Other taste types, such as sweetness, freshness, or bitterness, are also associated with changes in blood pressure. And there is convincing evidence that changes in salt sensitivity can be used to predict the onset of hypertension.[20] Li Hanqi et al. used the Geo Detector method to establish associations between seven flavors and multiple chronic diseases from the perspective of spatial stratification heterogeneity. They found that out of 71 chronic diseases, 16 diseases were significantly related to dietary taste. Compared to the impact of individual flavors, the interaction of flavors increases the risk of sixteen diseases, and the multiple combinations of flavors have a non-linear enhancing effect on disease risk.[21] In addition, taste is also related to diabetes, Parkinson's disease and cardiovascular disease.[22]

This study found that compared to people with moderate dietary tastes, those with a lighter diet have a significantly reduced risk of developing hemorrhoids. People with a lighter taste tend to choose vegetarian foods, consuming less salt, sugar, and fat in their bodies every day, while consuming a relatively higher proportion of dietary fiber. This not only reduces the burden of high sugar, high fat, and high salt foods on the digestive system, but also promotes the digestive function of the gastrointestinal tract, plays a role in preventing constipation, and thus reduces the risk of hemorrhoids. However, further research is needed to elucidate the reasons and mechanisms in this regard.

The correlation between constipation and hemorrhoids: Constipation refers to poor or difficult bowel movements, usually manifested as prolonged bowel movements, reduced frequency of bowel movements, dry stools, and difficulty in defecation. People usually attribute the onset of hemorrhoids to constipation and abnormal bowel habits, and believe that constipation is the main culprit. This is consistent with the results of this study. This study found that constipation can significantly increase the risk of hemorrhoids. Possible reasons are as follows: Constipation and excessive force during defecation may increase unnecessary burden on the muscles of the cecum, anus, and pelvic floor, as well as local congestion, leading to the occurrence of diseases. Effortlessly removing dry feces can also cause significant pressure on the anus, leading to a series of pathological changes such as bruising, swelling, and lacerations. At the same time, constipation and prolonged tension during defecation can cause tearing of the elastic support tissue. This may lead to distal displacement of the anal pad and the development of hemorrhoids.[23,24] In addition, studies have shown that hard stool and increased intra-abdominal pressure can hinder venous return, leading to congestion of the hemorrhoid plexus and arteriovenous anastomosis at the anorectal junction, thereby leading to the development of hemorrhoids.[25]

Talley NJ et al.'s study reviewed the relationship between constipation and specific comorbidities.[26] Their data suggests that constipation can have signif-

icant clinical consequences. And one consequence is haemorrhoids. There are research found that both retrospective and prospective case-control studies showed a significant association between constipation and hemorrhoids[5,27,28], or an increased prevalence of hemorrhoids in populations diagnosed with constipation[29]. Other studies have further demonstrated the association between hemorrhoids and constipation symptoms.[30] Hong YS et al. conducted a cross-sectional study on 194，620 healthy males and females who completed health screening examinations, including colonoscopy, from 2011 to 2017. The study also found that constipation is associated with hemorrhoids.[31]

Although it is widely believed that constipation is related to hemorrhoids, there are also inconsistent research results. Johnson and Sonnenberg found no association between hemorrhoids and constipation, aging, cirrhosis, and varicose veins.[32] They were also evaluating four large population data files in the United States, England, and Wales when they discovered epidemiological differences in constipation and hemorrhoids (i.e. different prevalence distributions by age, gender, and race). Although these studies suggest that the frequency of hemorrhoids in patients with and without constipation may be the same, they do not necessarily rule out a causal relationship between symptoms of constipation and hemorrhoids.[33]

The correlation between chronic gastritis and hemorrhoids: Chronic gastritis refers to various chronic inflammatory lesions of the gastric mucosa caused by different etiologies, and Helicobacter pylori infection is a common cause of chronic gastritis. Animal and human studies have confirmed that Helicobacter pylori infection can cause changes in the microbiota of the stomach or colon.[34-37] Yin et al. found in their experiment that the number of Staphylococcus aureus and Lactobacillus in the stomach and duodenum of Mongolian gerbils decreased after inoculation with Helicobacter pylori.[34] In the same model, Heimesaat et al. demonstrated that mice infected with immunopathological Helicobacter pylori B8 can increase the lumen load of Escherichia coli and enterococcus and Bacteroides/Prevotella in the cecum.[37] Research has found an interactive relationship between dysbiosis of gut microbiota and the onset of diarrhea.[38] Due to the disruption of the gut microbiota, an increase in enterotoxins can lead to symptoms of diarrhea, such as damage or increased sensitivity of the intestinal mucosa. Diarrhea patients have a significantly reduced number of bacteria in their feces compared to healthy individuals, accompanied by an imbalance in the proportion of bacteria. Diarrhea can also cause changes in the number and type of gut microbiota. Therefore, the mutual promotion of the two can easily lead to chronic diarrhea. Long term diarrhea can lead to excessive abdominal pressure during defecation, prolonged increase in abdominal pressure, and affect the blood flow of the rectal anal venous plexus, resulting in blood stasis and venous dilation. Over time, it may form hemorrhoids. In addition, due to the increase in bowel movements and frequent stimulation of the rectum and anus by feces, the local load increases, which is related to the damage to the veins at the rectum and anus. Some existing research results have also found a significant association between diarrhoea and hemorrhoids[32,33], but the mechanism is not yet clear and further research is needed.

In addition, chronic gastritis can lead to weakened gastrointestinal function, resulting in a decrease in the digestive and absorption functions of the gastrointestinal tract towards food. It may also cause difficulty in defecation and result in a defecation surface, which may also be a reason for the association between chronic gastritis and hemorrhoids.

Limitations

This study used a hospital-based case-control study, and the results were inevitably subject to selection bias. Moreover, this study was conducted among the Zhuang ethnic group in Guangxi, China, and the results are not applicable to other regions and populations of other ethnic groups. Besides, this study belongs to a retrospective observational study, and the ability to verify the etiology is relatively weak, and the causal relationship between various factors and hemorrhoids cannot be determined yet. Therefore, further experimental research is needed to confirm the research results. This is also our next research plan.

Conclusion And Recommendations

This study found that factors related to hemorrhoids include education level, dietary taste, constipation, and chronic gastritis. Among them, education level, constipation, and chronic gastritis are risk factors, while a bland diet is a protective factor. That is, among Zhuang people, the higher education level，the greater the risk of hemorrhoids; Patients with constipation and chronic gastritis are more likely to develop hemorrhoids; People with a bland diet have a lower risk of developing hemorrhoids. In order to prevent the occurrence of hemorrhoids, it is recommended that Zhuang people with high education avoid prolonged sitting and engage in appropriate physical activities. They should try to have a bland diet and pay attention to food combinations in their dietary habits. They should avoid consuming foods that are too irritating to the gastrointestinal tract and eat regularly to avoid constipation and chronic gastritis.

Contributors

Wu Huabei: Data analysis and interpretation, manuscript drafting, illustration and critical editing of

manuscripts; Sumatana Glangkarn: Corresponding author, research design guidance, conceptual design of works, data and manuscript review; Nachalida Yukalang: Guidance on Data Analysis; Rujira Nonsaard: Critical editing of the manuscript; Yin Shijie: data collection and interpretation, and critical editing of manuscripts.

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