Dietary habits associated with internal hemorrhoidal disease: a case-control study

Habitudes alimentaires liées à la survenue de la maladie hémorroïdaire interne: étude cas-témoins

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RÉSUMÉ

Introduction : La physiopathologie de la maladie hémorroïdaire interne est mal connue mais semble multifactorielle. Certains types d'aliments et de mode de vie ont été considérés comme des facteurs augmentant le risque de survenue de la maladie hémorroïdaire interne.

Objectifs : Déterminer les habitudes alimentaires liées à la survenue de la maladie hémorroïdaire interne.

Méthodes : Cinquante patients et 50 témoins appariés selon l'âge et le sexe ont été inclus dans une étude cas-témoins. Les apports alimentaires des patients et des témoins ont été évalués par la méthode du rappel des 72 heures et par un questionnaire de fréquence alimentaire. Les données relatives au comportement alimentaire ont été relevées via un questionnaire de comportement alimentaire.

Résultats : L'âge moyen des patients était de 42 ± 11.8 ans avec un ratio femmes-hommes de 1.17. Le prolapsus et la douleur anale étaient les symptômes les plus fréquents. La constipation a été notée chez la quasi-totalité des patients. Les aliments riches en fibres étaient moins fréquemment consommés par les patients que par les témoins avec une différence significative pour les légumes, les fruits et les céréales. Quant aux aliments épicés, la consommation du poivre et de la poudre de chili était significativement moins fréquente chez les patients par rapport aux témoins. L'analyse multivariée avait montré que la consommation quotidienne de fibres <12g (OR 7.08 ; 95% IC 1.24 – 40.30 ; p=0.027) et d'eau <2L (OR 8.68 ; 95%IC 3.07 – 24.51 ; p<0.001) augmente significativement le risque de maladie hémorroïdaire interne.

Conclusions : La maladie hémorroïdaire interne était plus fréquente parmi les patients ayant un régime alimentaire pauvre en fibres et un apport hydrique réduit. Ces habitudes alimentaires ont été considérées comme des facteurs favorisant la constipation qui était présente chez la quasi-totalité des patients.

Mots-clés
Constipation ; fibres ; hydratation

SUMMARY

Background: Pathophysiology of the internal hemorrhoidal disease is poorly understood but seems to be multifactorial. Some types of food and lifestyle have been assumed to increase the risk of internal hemorrhoidal disease.

Aims: To identify alimentary habits that are associated with internal hemorrhoidal disease.

Methods: Fifty patients and 50 healthy controls matched for age and sex were enrolled in a case-control study. Food intake of patients and controls was assessed by a nutritionist using the 72-hour recall method and the food frequency questionnaire. Data regarding their eating behavior were also collected using an eating behavior questionnaire.

Results: Mean age of patients was 42 ± 11.8 years with a female to male ratio of 1.17. Prolapse and anal pain were the most common presenting symptoms. Constipation was found in almost all patients. High-fiber foods were less often consumed by patients than by controls with the difference being significant for vegetables, fruits and cereals. Regarding spicy aliments, consumption of pepper and chili powder was found to be significantly less frequent in patients than in controls. Multivariate analysis revealed daily fiber intake < 12 g (OR 7.08; 95%CI 1.24 – 40.30; p=0.027) and daily water intake < 2L (OR 8.68; 95%CI 3.07 – 24.51; p<0.001) significantly increase the risk of internal hemorrhoidal disease.

Conclusions: Internal hemorrhoidal disease was more frequently observed in patients with low-fiber diet and a reduced water intake. These dietary habits were described as precipitating factors of constipation which was found in almost all patients.

Key-words
Constipation ; fibers, hydration

INTRODUCTION

Hemorrhoidal disease usually refers to symptomatic hemorrhoids. These are structures of submucosal, fibrovascular, arteriovenous sinusoids that are part of the normal anorectum (1). According to their origin relative to the dental line, hemorrhoids are categorized into internal (if proximal to the dentate line), external (if distal to the dentate line), or mixed (both proximal and distal)(2). The true prevalence of hemorrhoidal disease is unknown. It varies widely across the world from 4.4% to 86% and seems to be more common in men (3, 4). The exact pathophysiology of hemorrhoidal disease is poorly understood but certainly seems to be multifactorial. As most symptoms of hemorrhoidal disease seem to stem from the breakdown of the suspensory musculature of hemorrhoids, conditions that contribute to this breakdown have been described as risk factors of hemorrhoidal disease. Thus, aging, obesity, constipation, frequent straining, pregnancy, and collagen vascular abnormalities have been suggested to be risk factors of hemorrhoidal disease (5). Moreover, some types of food and lifestyle, including low intake of dietary fiber, spicy foods, alcohol consumption and sedentary mode of life have been suggested to be associated with the development of hemorrhoidal disease (6). Data regarding the impact of dietary habits on the development of internal hemorrhoidal disease in Tunisian population are lacking. The aim of the current study was to identify alimentary habits that are associated with internal hemorrhoidal disease in our patients.

METHODS

The study was performed in accordance with the Declaration of Helsinki of the World Medical Association and was approved by the local ethics committee. All patients gave their informed consent prior to the study inclusion.

Patient population and study design:

Fifty patients and 50 healthy volunteers matched for age and sex were enrolled in a case-control study. Criteria for inclusion were diagnosis of internal hemorroidal disease and age range between 20 and 65 years old. Exclusion criteria were associated anorectal diseases (anal fistula, perianal abscess, proctitis, etc), colorectal or anal cancers, inflammatory bowel diseases and personal history of anorectal surgery. Data regarding demographic characteristics, past medical history and presenting symptoms were collected by interviewing patients.

Diagnosis and grading of hemorrhoids:

Patients who presented with anorectal symptoms underwent proctologic examination. The latter was performed in the genu-pectoral position and included three essential steps: a visual inspection of the perianal area, a digital rectal examination and anoscopy. Diagnosis and grading of internal hemorrhoids was made by anoscopy on the basis of the classification of Banov et al (7):

- Grade I: non-prolapsing internal hemorrhoids
- Grade II: Internal hemorrhoids prolapse during defecation, spontaneously reduced
- Grade III: Internal hemorrhoids prolapse during defecation, must be manually reduced
- Grade IV: Internal hemorrhoids prolapsed and incarcerated

A rigid or flexible sigmoidoscopy was also performed to rule out the presence of rectosigmoid neoplasia, proctitis, or inflammatory bowel disease.

Dietary habits assessment:

Food intake of patients and controls was assessed by a nutritionist using the 72-hour recall method and the food frequency questionnaire. Data regarding their eating behavior were also collected using an eating behavior questionnaire.

- The food frequency questionnaire:

The food frequency questionnaire contained a list of the most common local food and drink and was administered during 20 to 30 minutes. Foods were divided into two major groups: high-fiber foods (vegetables, fruits, cereals, lentils, oleaginous seeds, dried fruits) and low-fiber foods (pasta, meat, milk and dairy products, raw olive oil). Patients were divided into two sub-groups according to the median frequency of food consumption (above or below median value).

- The 72-hour recall:

Patients and controls provided detailed data about their food and beverage intake during the previous three days. The 72-h recall questionnaire contained a food list. The amounts of each food consumed are estimated in reference to a common size container (cups, bowls, glasses, spoons…). Preparation methods of foods are also precisely described to include all the ingredients used.

- Eating behavior questionnaire:

Patients were queried about feeding schedule, meal

skipping, posture when eating and water drinking.
All items of dietary assessment were compared between patients and controls to identify dietary habits that are associated with internal hemorrhoidal disease.

Data analysis

Food intake was analyzed by Bilnut Version 2.01 software 1991. Statistical Package for Social Science (SPSS) software version 21.0 (IBM Corp., Armonk. New York, USA) was used for analysis of data. Data were summarized as mean and percentage. Study groups were compared using the $\chi 2$ test for qualitative variables. Student's t and ANOVA tests were used for analysis of parametric data. Mann–Whitney U and Kruskal–Wallis H tests were used for analysis of non-parametric data. Odds Ratios (OR) and 95% confidence intervals (CIs) were calculated. ROC curves were constructed to determine cut-off values of dietary intake above or below which the risk of hemorroidal disease increases. The optimal sensitivity and specificity were the values yielding maximum sums from the ROC curve. A multivariate logistic regression model was generated by including significant variables in the univariate analysis to identify dietary habits that are associated with hemorroidal disease. P-value less than or equal to 0.05 was considered significant.

RESULTS

Characteristics of the study population:

Fifty patients and 50 controls fulfilled the inclusion criteria and were enrolled in the study. The descriptive characteristics of the study population are shown in Table1. The patients were middle-aged (42 ± 11.8 years) with a slight female predominance (female to male ratio of 1.17). Prolapse and anal pain were the most common presenting symptoms. Constipation was found in almost all patients. Approximately two-thirds of patients had hemorrhoids grade II.

Table1: Characteristics of the study population

Characteristics	Patients N=50	Control group N=50
Age, years, mean ± SD	42 ± 11.8	42 ± 11.6
Gender, n, (Male / Female)	23 / 27	22 / 28
BMI, Kg/m², mean ± SD	25.1 ± 3.1	_
Level of education, n (%)		
- Illiterate	9 (18)	
- Primary	15 (30)	_
- Secondary	15 (30)	
- Tertiary	11 (22)	
Symptoms, n (%)		
- Bleeding	34 (68)	
- Prolapse	46 (92)	_
- Anal pain	49 (98)	
- Constipation	47 (94)	
Hemorrhoid grading, n (%)		
- Garde I	15 (30)	
- Grade II	30 (60)	_
- Grade III	5 (10)	
- Grade IV	0 (0)	

SD; standard deviation

Comparison of food intake frequency according to the food frequency questionnaire:

Patients were divided into two sub-groups according to the frequency of twice daily. High-fiber foods were less often consumed by patients than by controls with the difference being significant for vegetables, fruits and cereals. Similarly, a significantly less frequent consumption of low-fiber foods was noticed among patients than controls with only a marginal statistical significance for milk and dairy products (p=0.06). Regarding spicy aliments, consumption of pepper and chili powder was found to be significantly less frequent in patients than in controls. However, there was no significant difference between both groups in frequency of beverages consumption (Table 2).

Table 2: Comparison of food intake frequency as stated from the food frequency questionnaire between patients and controls

Food groups (frequency/week)	Patients	Controls	Univariate analysis	
			P value	Odds ratio (95% CI)
High-fiber foods				
Vegetables, n (%)				
≤ twice/week	27 (54)	8 (16)	<0.0001	3.37 (1.70 – 6.69)
> twice/week	23 (46)	42 (84)		Ref
Fruits, n (%)				
≤ twice/week	23 (46)	8 (16)	<0.0001	5.75 (2.14 – 15.42)
> twice/week	27 (54)	42 (84)		Ref
Cereals, n (%)				
≤ twice/week	47 (94)	38 (76)	0.01	1.23 (1.04 – 1.46)
> twice/week	3 (6)	12 (24)		Ref
Lentils, n (%)				
≤ twice/week	47 (94)	46 (92)	1.00	1.02 (0.91 – 1.13)
> twice/week	3 (6)	4 (8)		Ref
Oleaginous seeds, n (%)				
≤ twice/week	46 (92)	40 (80)	0.08	0.4 (0.13 – 1.19)
> twice/week	4 (8)	10 (20)		Ref
Dried fruits, n (%)				
≤ twice/week	50 (100)	49 (98)	1.00	1.02 (0.98 – 1.06)
> twice/week	0 (0)	1 (2)		Ref
Low-fiber foods				
Pasta, n (%)				
≤ twice/week	42 (84)	27 (54)	0.001	1.55 (1.17 – 2.06)
> twice/week	8 (16)	23 (46)		Ref
Meat, n (%)				
≤ twice/week	50 (100)	44 (88)	0.02	1.13 (1.02 – 1.25)
> twice/week	0 (0)	6 (12)		Ref
Milk and dairy products				
≤ twice/week	16 (32)	8 (16)	0.06	0.81 (0.64 – 1.01)
> twice/week	34 (68)	42 (84)		Ref
Raw olive oil				
≤ twice/week	31 (62)	19 (38)	0.01	1.55 (1.03 – 2.31)
> twice/week	19 (38)	31 (62)		Ref
Spicy aliments				
Pepper				
≤ twice/week	35 (70)	11 (22)	0.0001	3.18 (1.83 – 5.52)
> twice/week	15 (30)	39 (78)		Ref
Paprika				
≤ twice/week	20 (40)	14 (28)	0.2	0.83 (0.62 – 1.10)
> twice/week	30 (60)	36 (72)		Ref
Chili powder				
≤ twice/week	35 (70)	22 (44)	0.009	1.59 (1.10 – 2.28)
> twice/week	15 (30)	28 (56)		Ref
Fluids				
Tea, n (%)				
≤ twice/week	33 (66)	7 (54)	0.20	0.73 (0.45 – 1.20)
> twice/week	17 (34)	23 (46)		Ref
Coffee, n (%)				
≤ twice/week	27 (54)	5 (10)	0.50	0.95 (0.82 – 1.10)
> twice/week	23 (46)	45 (90)		Ref
Alcohol, n (%)	4 (8)	1 (2)	0.30	0.93 (0.85 – 1.02)

Comparison of daily dietary intake according to the 72-hour recall:

Overall, there was no significant difference in total energy intake (kcal/day) between patients and controls. However, protein intake and protein energy ratio were significantly lower in patients than controls. Similarly, fiber intake (g/day) was significantly lower in patients than in controls (Table 3). By constructing the daily fiber intake ROC curve, the best sensitivity and specificity were found for a threshold value of 12 g (specificity=96% and sensitivity=70%). Thus, patients who had a daily fiber intake <12 g, were more likely to develop internal hemorroidal disease (OR=7.00; 95%CI: 1.67 - 29.21; p=0.001). Likewise, on the daily protein intake ROC curve, the cut-off value of 55 g had the best sensitivity (72%) and specificity (94%). Thus, patients who took < 55 g of proteins daily had greater risk to develop internal hemorroidal disease (OR=7.00; 95%CI: 1.70 - 29.50; p=0.002).

Table 3: Comparison of mean daily dietary intake as stated from the 72-hour recall between patients and controls

	Patients	Controls	Univariate analysis P value
Energy (kcal), mean ± SD	2021.4 ±378.7	1989.9 ±280	0.7
Carbohydrates (g), mean ± SD	280.3 ±56.5	274.9 ±56.3	0.6
Proteins (g), mean ± SD	63.9 ±12.3	71.2 ±11.4	0.002
Fat (g), mean ± SD	71.3 ±19.1	67.8 ±16.2	0.2
Fibers (g), mean ± SD	15.1 ±5.5	19.6 ±6.2	<0.0001
Carbohydrates (%), mean ± SD	55.7 ±4.8	54.7 ±6.6	0.5
Proteins (%), mean ± SD	12.8 ±2.1	14.5 ±2.3	<0.0001
Fat (%), mean ± SD	31.5 ±5.1	30.6 ±6	0.4

SD: standard deviation

Comparison of eating behavior:

Overall, patients had lower daily water intake than controls. However, water intake during meals was significantly more common in patients than controls. Likewise, standing posture when eating and regular meal schedules were more reported by patients than by controls (Figure 1).

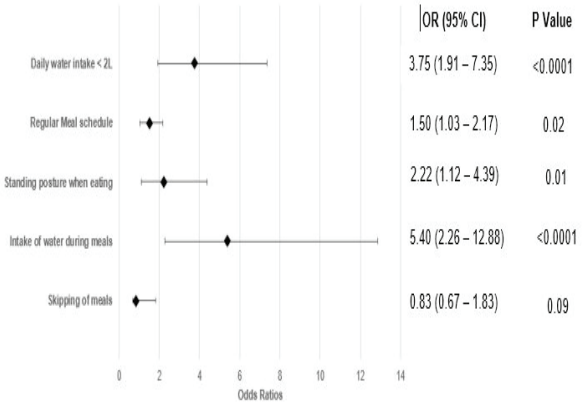

Figure 1: Forest Plot: Comparison of eating behavior between patients and controls

Dietary habits associated with internal hemorrhoidal disease

Multivariate logistic regression model generated by the inclusion of the dietary habits that are significant in the univariate analysis revealed that fiber intake < 12 g daily (OR 7.08; 95%CI 1.24 – 40.30; p=0.027) and water intake < 2L daily (OR 8.68; 95%CI 3.07 – 24.51; p<0.001) could significantly increase the risk of internal hemorrhoidal disease.

DISCUSSION

The current study showed that low dietary fiber intake (<12 g/day) and lack of proper hydration (<2L/day) could increase the risk of developing internal hemorroidal disease. To our knowledge, there was no previously published studies investigating the impact of dietary habits on the risk of developing internal hemorroidal disease among Tunisian patients. The main limitation of this study lies in the relatively small sample of people studied.

Risk factors for hemorrhoids remain poorly investigated. In fact, several studies have reported an increased risk of hemorrhoidal disease in patients with constipation mainly in those with excessive staining (8-13). In the current study, almost all patients had constipation (94%).This association has been explained by the disruption of the anal cushions by the forces of defecation and passage of hard stools(14). Actually, many dietary habits were described as precipitating factors of constipation.

Indeed, constipation was found to be more frequent in patients with low dietary fiber intake. It has been noted

that patients who had about 7 g daily of fiber had a 3-fold higher prevalence of constipation than those who took 20 g daily of dietary fibers (15). Thus, low dietary fiber intake has been associated with an increased risk of hemorrhoids (16). Fiber supplement is therefore regarded as an effective treatment of symptomatic hemorrhoids as fiber intake has been positively associated with increased bowel movement frequency and fecal mass in patients with constipation(17). Alonso-Coello et al showed that fiber supplement reduced the risk of bleeding and persisting symptoms by 50% and 47% respectively, but it had no significant effect on pain and prolapse (18). Furthermore, fiber supplement may reduce risk of symptomatic hemorrhoids independently of its effects on bowel movement frequency. In fact, Peery et al found that high grain fiber intake reduced risk of hemorrhoids even after adjustment for constipation (16). Thus, recent guidelines have recommended dietary fibers in the treatment of hemorrhoids as they are intended to regulate the consistency and frequency of stools (19, 20). In the current study, when considering the 72-hour recall, overall dietary fiber intake was significantly lower in patients than in controls. Moreover, a daily fiber intake <12 g was considered as a risk factor of internal hemorroidal disease development. However, according to the food frequency questionnaire, not only high-fiber foods but also low-fiber foods were less frequently consumed by patients than by controls. This could be due to the fact that food frequency questionnaire determines the frequency of food consumption and is not sensitive enough to measure the absolute intake of specific nutrients.

As regards fluids, it has been suggested that daily fluid intake had a significant influence on both bowel movement frequency and fecal mass (21). Although the effects of fluid intake on constipation have never been demonstrated in controlled studies, inadequate fluid intake has been considered to be an important cause of constipation (22). Moreover, according to Anti et al, the effect of dietary fiber on constipation can be significantly enhanced by a daily intake of approximately 1.5 L of mineral water. In fact simple fluid restriction (<500 mL/day) significantly reduced the weekly frequency of bowel movement with respect to that observed during a control period in which fluid intake was 2500mL/day. It has been hypothesized that the increase of the intestinal water content helps produce softer stools and facilitate their transit through the gastrointestinal tract (23). Our findings were in accordance with those reported in the above studies since water intake < 2L daily was found to increase the risk of internal hemorrhoidal disease in our patients.

Other dietary factors including spicy foods and alcohol intake have been implicated in the development of internal hemorrhoidal disease. It has been suggested that ingestion of spicy foods exacerbates hemorrhoid symptoms (2). However, this effect has not been reported in a short-term randomized trial where patients who ingested red hot chili pepper did not show worsening of their hemorrhoidal symptoms (24). Moreover, in the present study, pepper and chilli powder were found to be consumed significantly less frequently in patients than controls. Alcohol intake has also been considered among factors associated with an increased risk of hemorrhoidal disease (6, 25). Our findings were not in agreement with these studies as there has been no difference in alcohol consumption between patients and controls. However, our results should be interpreted carefully since there were only five alcohol consumers among patients and controls.

In conclusion, hemorrhoidal disease was more frequently observed in patients who had a low-fiber diet and a reduced water intake. These dietary habits were described as precipitating factors of constipation, which is assumed to increase the risk of hemorrhoidal disease. Actually, the effect of dietary fibers in the treatment of constipation is well established so that fiber supplementation is a cornerstone of conservative treatment of hemorrhoids. Contrary to expectations, alcohol consumption and spicy foods have not been found as risk factors for hemorrhoidal disease development in the current study.

Authors declared they have no conflict of interest

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