Original

Nutritional Status and Diet Characteristics in Patients with Intestinal Obstruction Due to Food Residues at Hospital in Vietnam

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ABSTRACT: *Background and purpose*. Bezoars are collections of undigested foreign material that accumulate in the gastrointestinal tract. Phytobezoars are the most common, which are formed from plant fibers, especially those related to the ingestion of at-risk foods such as persimmon, guava, dried bamboo shoots and so on. Patients who undergo abdominal surgery, including bariatric surgery for obesity, and particularly gastrectomy, are prone to bezoar formation due to reduced gastric motility, loss of pyloric function, and hypoacidity. Bezoars can form months to years postoperatively. Our objective was to describe nutritional status, dietary characteristics, and some factors in patients with intestinal obstruction caused by food residues. *Methods*. A descriptive study was carried out on 43 inpatients who were diagnosed with intestinal obstruction because of bezoars. Participants will be interviewed with a set of questions about the frequency of food consumption by using food photobooks, scales, and height gauges. The patient opened his mouth to count the number of missing teeth and dentures. *Results.* There were many patients with a history of eating high-risk foods such as persimmons (40.5%) with the average weigh was 168.5 grams, guava (43.6%) with the average weight was 87.4 grams. The number of patients with stomach diseases, diabetes, dental problems accounted for 69.7%, 25.5%, 43.6% respectively. Winter season recorded the most cases of intestinal obstruction with 44.3%. *Conclusion.* Research has shown that the majority of patients consumed high-risk food groups. The frequency of eating foods quite regularly, especially the foods enrich fiber content. The medical history was also account for a fairly high rate, especially digestive problems up to 88.3% of people. Therefore, screening and preventive measures for patients with risk factors, and the elderly are essential to prevent intestinal obstruction due to food residues.

Key Words: Bezoars, phytobezoar, high fiber foods, persimmons, intestinal obstruction

INTRODUCTION

Intestinal obstruction is one of the most common surgical emergencies caused by various conditions. It is the second prevalence reason only after appendicitis (1,2). There are two main types of intestinal obstruction: mechanical intestinal obstruction and functional intestinal obstruction (2). Depending on the degree of gastrointestinal obstruction and duration, intestinal obstruction is divided into acute intestinal obstruction and subacute intestinal obstruction (1).

Intestinal obstruction caused by food residues (Bezoar) is one type of mechanical intestinal obstruction. Bezoars are solidified substances formed by mixing indigestible exogenous substances with other substances in the gastrointestinal tract; bezoars are commonly found inside the stomach but can enter the small intestine via the pylorus. Once the diagnosis of bezoar is made, the bezoar is dissolved or removed, because it can cause gastric outlet obstruction, ileus, ulcerations due to pressure necrosis, and subsequent gastrointestinal bleeding (3). Bezoars are mainly classified into four types according to their composition: phytobezoars, trichobezoars, pharmacobezoars, and lactobezoars (3).

The formation and development of bezoars can occur at any age. However, many studies showed that the nutritional status and dietary habits play a key role in producing bezoars, especially in the elderly with an imbalance in nutritional status, which could create a negative impact on their quality of life and cause increased morbidity and mortality. Phytobezoar is one of the most common bezoars around the world (4), which consists of fruit and vegetable fibers (5). This was why, older people consume a large amount of food with high-fiber content and inadequate chewing, which can lead to small bowel obstruction (6,7). These factors are partly related to dietary habits. Furthermore, the aging process and some of the related physiologic changes can predispose one to phytobezoar formation. For example, older people can find it difficult to chew food well if they have some abnormal characteristics, including losing teeth, weakening teeth, and swelling gums (8). In a study conducted by NJ Talley in 1992, the older population usually had decreased gastrointestinal motility and elastic bowel that could lead to a high chance of constipation (9). It is considered as a reason leading to the accumulate and establishment of phytobezoar in the gastrointestinal tract (10).

Worldwide, there has been a relative study on the cause of intestinal obstruction due to food residues, but most of the studies are related to the formation mechanism of food residues with the relationship between stomach diseases, pancreatitis, the reduction

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of gastric acid after gastric bypass surgery. The study conducted by Kement et al in 2012 showed that patients' surgical stomach history was a high-risk factor, which could lead to the establishment of bezoars and accounted for the largest number of causes at 48% (4). Similar results were found in others studies such as Krausz et al in Israel (1984) (5) and Bowden in Georgian (1983) (6), which showed that the percentage of intestinal obstruction patients relating to surgical stomach history were 20% and 93% respectively. The treatment of peptic ulcers with proton-pump inhibitors is also one of the risk factors for the formation of food residues by the drug's mechanism of reducing gastric acid secretion (7). In addition, long-term consumption of certain food high in insoluble fiber such as cellulose, hemicellulose, lignin, and food with an acrid taste (tannin) by these patients may also be the cause of phytobezoars. The US Food and Drug Administration allows foods to be labeled ''a good source of fiber'' or ''high fibre'' if they contain more than 2.5 g or 5.0 g of dietary fiber per serving (100g), respectively (19). In the foods at risk also contain a large amount of fiber such as persimmons (2.5g), guava (6g), bamboo shoots (4.1g), figs (2.9g). In terms of astringency, tea also contains a large amount of tannins (20). Persimmons are typical foods causing phytobezoars in some Asian countries such as Japan with 40% (11) and Korea up to 76.4% (12) of people with intestinal obstruction. The formation and accumulation of bezoars in the gastrointestinal tract rely on many factors, and it is not only related to the types of fiber but also to the quantity of that fiber at each time of consumption. A few Vietnamese studies have suggested high-risk foods, but they did not provide comprehensive information about the amount and the frequency of using these foods in the advanced formation of bezoars.

In terms of diagnoses, intestinal obstruction due to food residues does not have much difference in clinical and subclinical manifestations compared with mechanical intestinal obstruction due to other causes. That makes the rate of accurate diagnosis of the cause of intestinal obstruction because of food residue in clinical practice is not high. Therefore, most cases are diagnosed postoperatively and there will be increased morbidity and mortality rates (13). Research on gastrointestinal foreign bodies in the form of food residues in Vietnam is rare and currently, we have not found any official documents on the frequency of using foods with a high risk of forming bezoars.

METHODS

Study settings and subjects

This was a descriptive study that used the cross-sectional study design and was conducted for a year from January 2020 to December 2021. We collected data on a convenience sample in all departments in Hanoi Medical University Hospital during a year and got a total of 43 subjects. The inclusion criteria were that patients were diagnosed with intestinal obstruction due to food residue. The study excluded patients who had been diagnosed with other causes such as postoperative adhesions, olvulus, intussusceptions, hernia, and tumours and refused to participate in the study.

Data collection

The established a private direct interview with participants at Hanoi Medical University Hospital. The interview usually took 45 minutes to 60 minutes, we carefully explained and listened to the participants' answers. To limit the error in the quantity and the frequency of using food, we used a picture book about the food serving that was published by the Vietnamese National Institute of Nutrition. The patients opened their mouth and we counted the number of missing teeth and dentures. Biases were controlled by using a single equipment tool and one researcher to collect the data for all subjects.

Statistical Analysis

The data were entered by using Microsoft Excel Workbook 2016 (Microsoft Corporation, Hanoi, Vietnam) and Stata 14.0 statistical software (StataCorp LLC, California) for analysis. The results have been presented as frequency, percentage, and mean**.**

Ethics Approval

The study has been approved by the research review board of Hanoi Medical University Hospital. All participants were fully informed about the purposes of the study.

RESULTS

The study was conducted on 43 patients (23 males and 20 females) diagnosed with intestinal obstruction due to food residue. The average age of the study subjects was 58.7±19.1, the youngest was 18 years old and the oldest was 93 years old.

Table 1 shows the outcomes on the patient's clinical features and possible risk factors for bowel obstruction. Regarding medical history, Gastroenterology diseases accounted for the most proportion with nearly 70%, followed by diabetes mellitus with 25.5%. Diseases of gastric surgery, hypertension accounted for 18.6% equally. There were 43.6% of people had trouble with dental health. These problems were mostly weak teeth, lost teeth, alternative teeth, sensitive teeth. In terms of anthropometric index, the study assessed nutritional status according to BMI classification for Asian populations. The majority of patients had normal nutritional status (63.2%), the proportion of malnourished patients was 29% and at least the patients were overweight and obese (7.8%). The final section of the table was the results on the frequency of diseases in different seasons of the year. The proportion of patients with intestinal obstruction was greatest in winter (44.3%), followed by spring with 1/5 of patients. Summer and autumn accounted for 16.2% and 18.6% respectively.

Figure 1 shows the results of food intake and frequency of eating high-risk foods in the 3 months prior to the date the patient was diagnosed with bowel obstruction. Guava was the most consumed food with 43.6%, followed by persimmon with 40.5%. The proportion of patients who had ever consumed bamboo shoots and figs was more than a quarter. The average weight of persimmon was 168.5 (g), and there was a big difference between the smallest (78g) and the largest (312g) mass. The amount of bamboo shoots consumed was close to that of guava at 94.8 (g) with the former and 87.4 (g) with the latter. The weight of figs consumed was the least with 41.2 (g) on average and the smallest (28g), the largest (70g).

Table 2 provides data on the frequency of consumption of high-risk food groups over the past three months. High-fiber foods were regularly consumed by patients with a frequency of 16.1±13.5. The groups of foods with acrid taste, high in fiber and acrid taste, and beverages had a large difference between the frequency of use of the subjects, at 2.1±4.7, 3.9±8.8, and 9.7±13.4, respectively.

Table 1. Clinical features of the patient

	All (n)	Percentage (%)
Medical history		
Gastroenterology (Stomach ulcers, Gastroesophageal reflux disease,..)	30	69.7%
Gastrectomy	8	18.6%
Diabetes mellitus	11	25.5%
Hypertension	8	18.6%
Suffering from two diseases	9	20.9%
Dental problems		
Yes (People with dental problems)	19	43.6%
No (People without dental problems)	24	56.4%
BMI (kg/m^2)		
Underweight (BMI <18.5 kg/m^2)	12	29%
Normal (BMI 18.5 – 24.9 kg/m^2)	27	63.2%
Overweight and Obese (BMI of ≥25 kg/m^2)	4	7.8%
Seasonal disease frequency		
Spring (From January to March)	9	20.9%
Summer (From April to June)	7	16.2%
Autumn (From July to September)	8	18.6%
Winter (From October to December)	19	44.3%

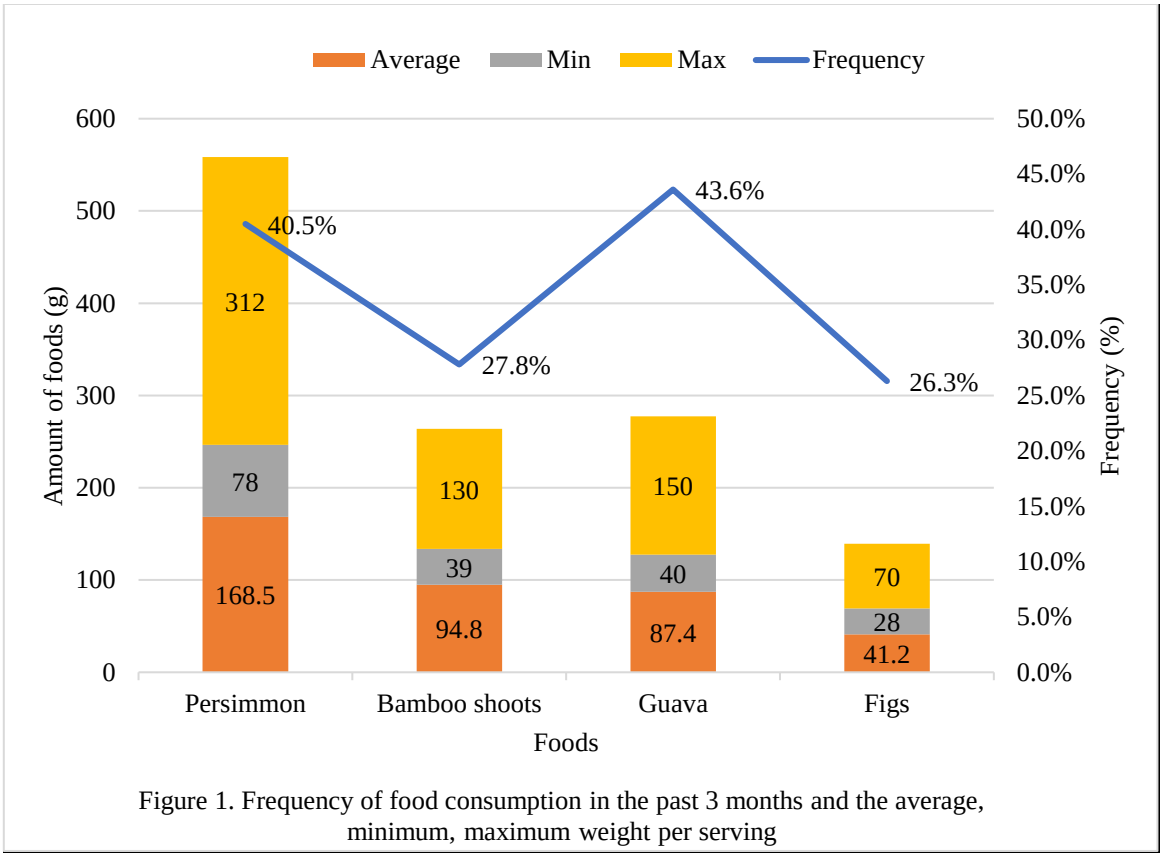

Figure 1. Frequency of food consumption in the past 3 months and the average, minimum, maximum weight per serving

Table 2. Frequency of food consumption in the past three months

	Mean+SD	Median
High-fiber food group	16.1±13.5	11
Food group with an acrid taste	2.1±4.7	1
Food group high in fiber and acrid taste	3.9±8.8	0
Beverage group	9.7±13.4	2

DISCUSSION

The study was conducted on 43 patients diagnosed with intestinal obstruction due to food residue at Hanoi Medical University Hospital in 2020-2021. The average age of the subjects was 58.7 years old, ranging from 18 to 93 years old. The number of males was higher than females with 53.5% of males and 46.5% of females.

There are many risk factors for intestinal obstruction due to food residue. Daily food consumption also plays an important role in the formation of bezoars in the intestinal lumen. In Vietnam, according to a study of Dong NV in 2005, 38.1% of patients had a medical history of consuming enriched fiber, acrid taste (tannin), and resin foods before admitting hospitals, in which history of eating persimmons made up the largest percentage at 26.2%, and the percentage of patients with the history of consuming dried bamboo shoots was about 5.9% (1). In another study of Hung HT in 2007, the percentage of patients with a history of consuming persimmons and patients with a history of eating dried bamboo shoots was 53.8% and 23.1% respectively (2). Moreover, there were some cases with a history of eating the orange pith, tangerine, and unripe banana (14). Worldwide, in 2012, excessive consumption of persimmon was identified in 40.5% in Kement's study in Poland (4), also in this country, Erzurumlu et al reported that 17.6% of their 34 patients with bezoars had a history of persimmon or cherry laurel intake (15). Persimmon, which grows in many areas in our region and is widely consumed, is the fruit of a number of species of trees belonging to the genus Diospyros. A history of persimmon intake was obtained in only 103 of the 113 patients (91.2%) by Krausz et al, since at the beginning of the study period, surgeons were not aware of the association between phytobezoar induced intestinal obstruction and persimmon ingestion (5). These figures were similar to our study, with 40.5% of patients having a history of eating persimmon in three months before being diagnosed with intestinal obstruction due to food residue. Furthermore, patients often suffered from intestinal obstruction in the first and last months of the year - these were the seasonal months of some high-risk foods such as persimmons, bamboo shoots, beans, oranges, and so on. In Hong Kong, EM Chisholm et al. reported that two-thirds of the patients in their study became ill in the last months of the year. The author has also emphasized the relationship between the season and harvest season of persimmons. In this country, persimmons are consumed a lot during the Mid-Autumn Festival as traditional culture, this is also the harvest month of persimmons. Similarly in Vietnam, August to December is also the season of persimmons, so people will consume more persimmons than other months of the year. Around this time, Vietnamese people celebrate the Lunar New Year, and bamboo shoots are often eaten during Tet meals. As a result, it is possible that cultures and food harvest seasons influence the patient's food intake. Besides, some foods were also suspected to be factors that catalyze the formation of food residues such as guava, bamboo shoots, and figs with the percentage of 43.6%, 27.8%, and 26.3%, respectively. Most previous studies have only investigated whether or not patients ate the risk foods. In our study, we studied the frequency of using high-fiber food groups, and foods with astringent taste within three months of the patient's diagnosis of intestinal obstruction, and we also investigated the amount of food eaten using food picture books to suggest to the patient how much food was eaten. For some high-fiber foods such as persimmons, bamboo shoots and guava, the patient's average intake was 168.5 (g), 94.8 (g), and 87.4 (g), respectively. Figs are an acrid food that was also consumed regularly with an average weight of 41.2 (g).

In addition to the intake of large amounts of cellulose materials, other possible risk factors include a history of gastrointestinal surgeries (such as gastrectomy, gastrojejunostomy, and other stomach diseases) or diabetes caused by various factors. In our study, there were 69.7% of patients with a history of previous gastric diseases, 18.6% of those had gastric surgery. The percentage of people having surgery was less than other studies around the world such as F Serour with 34 patients (83%) having a history of previous gastric surgery for ulcer (16). Partial gastrectomy can reduce gastric acid secretion, resulting in a weakly acidic environment and a decrease in gastric motility; thus, removal of undigested solids from the stomach is likely delayed, thereby causing high amounts of viscous contents to form inside the stomach, which is prone to bezoar formation (17). We also collected 25.5%% of patients with a history of diabetes, this number was lower than Metin Kement's study with 28.6% (4). Through these studies, we realized that gastric diseases could be a risk factor for intestinal obstruction, so we needed to have measures and plans to prevent early intestinal obstruction in patients.

Moreover, we also found that 43.6% of patients had problems with teeth, jaws, and faces. These patients were mostly missing teeth or were using dentures. This makes it difficult for the person to chew and swallow. As a result, the food is not crushed enough, so when consuming a large amount of fiber, it can cause blockage of the intestinal lumen because the intestine cannot be digested. People who have missing teeth or dentures often struggle to chew all the foods they wish to eat. Without a full set of teeth, food selection may be narrow. Some people complain that they could't chew vegetables or meats. Others will suffer psychological effects when they avoid socializing and eating meals out in restaurants with friends or family. Poor masticatory performance was associated with significantly lower intakes of insoluble and dietary fiber for both sexes (18).

Based on this study, we found that patients with intestinal obstruction due to food residue in Vietnam also regularly consume high-risk foods as in other countries around the world. Vietnam is a tropical country, so it has a wide variety of foods. Each season will have different quality foods and very reasonable prices, guiding people to choose foods to consume regularly. Consuming large amounts of these foods in combination with a medical history such as stomach problems or dental issues increases the risk of food residue formation. Therefore, it is necessary to have backup plan or instruct patients on how to choose the right food for themselves.

In conclusion, it can be seen that most patients have consumed high-risk food groups with a fairly regular frequency. Fiber-rich foods were eaten by the patients the most, especially persimmons, with an average serving weight of more than 168 grams. Research also showed that the disease often occurs in the cold months

in Vietnam. In addition, a history of diseases such as diabetes (25.5%), stomach disease (88.3%), or dental problems (43.6%) was also common in the study subjects. Therefore, screening and preventive measures for patients with risk factors, and the elderly are essential to prevent intestinal obstruction due to food residues.

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