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Original Article

Effectiveness and applicability of low FODMAP diet in the irritable bowel syndrome: Preliminary results of a prospective study

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Abstract:

Introduction:
Irritable bowel syndrome (IBS) is a very common entity that alters patient's life quality worldwide. Several therapeutic modalities are available with variable results. Recently, the low-FODMAP diet effect on IBS symptoms has been proven.
The aim of our study was to study the efficiency of this diet and to assess its applicability in a Tunisian IBS group of patients.

Methods:
A longitudinal, prospective study including 34 patients with IBS was conducted. Patients responded to a food frequency survey and had to follow a low FODMAP diet with a dietary guide education for 3 weeks. After the diet, a telephone questionnaire was conducted to evaluate adherence and treatment efficiency.

Results:
Mean of the population age was 56.5 (21 - 83 years) with a sex ratio of almost ¼. The initial food survey showed a large consumption of white bread and fruits. Tolerance to rich in FODMAP foods was variable among patients. Up to 97% of patients adhered to the low FODMAP diet. A decrease in abdominal pain in 88% of cases and in bloating in 64.7% of cases ($p = 0.007$) were noted after the diet.

Conclusion:
In our patients, the low FODMAP diet showed satisfactory results with good adherence, and improvement of IBS symptoms. However, it is important to note the difficulty of a long-term diet in a population with a variable alimentary habit.

Key words: low FODMAP diet; irritable bowel syndrome, applicability, Tunisia

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Introduction

Prevalence of irritable bowel syndrome (IBS) is high in the general population, estimated between 10-15% and around 21% in Tunisia [1]. The treatment is mostly based on medical prescription. However, more than two-thirds of patients make the link between symptoms and diets and claim the exclusion of some foods themselves. Several diets have been tried like gluten or lactose free diet but no study to date has demonstrated their definite effectiveness [2].

Recently, low fermentable oligosaccharide disaccharide monosaccharide and polyols (FODMAP) diet has been considered in the management of this disease. Our aim was to study the effectiveness of the poor FODMAP diet on IBS symptoms and to assess the adherence in Tunisian patients.

Patients and methods

A prospective longitudinal study involving 34 Tunisian patients with irritable bowel syndrome was conducted. All Patients presenting an IBS (according to Rome IV criteria) with total normal colonoscopy who gave informed consent for the enrollment were included. The Patients with history of diabetes, celiac disease, abdominal surgery, diverticulitis, food allergies, or taking medicines that can cause intestinal functional disorders were not included in the study. All Patients withdrawing their consents for the study or those unreachable by phone for the control questionnaire were excluded from the study. The study was done in several steps. An objective initial evaluation of the patient's symptoms was performed by visual analog scale for pain (VAS) and Bristol scale for stool consistency. Biological assessment (cell blood count, C reactive protein, glucose random, thyroid function and serology of celiac disease) was performed and the colonoscopy results were collected. Patients then answered to a qualitative and quantitative food questionnaire. A food education was then carried out with an explanation of the FODMAP poor diet protocol and distribution of a summary manual including authorized foods, foods to be weighed, and prohibited foods as well as examples of FODMAP-poor dishes to be prepared. The recommended duration of the diet was three weeks. The following health and dietary advice were also recommended: Maintain good hydration (drink minimum 1.5L of water per day), regular physical activity, a recommendation to eat slowly and chew the food, prohibit chewing gums that increase the flatulence, avoid fatty and spicy foods, and avoid snacking.

A follow up was performed during the diet and patients noted if they presented an improvement of their symptoms.

Three weeks after initiation of the diet, patients were contacted by phone to respond to a second questionnaire to assess the diet adherence and efficiency on IBS symptoms with a re-evaluation of the VAS and Bristol scales. For the third phase of adaptation of diet, patients were also contacted to evaluate the improvement of their symptoms.

A descriptive and analytical study were conducted (SPSS 23 software). The comparison among the quantitative variables were made using the Student's test, and in case of non-validity the non-parametric Mann-Whitney test.

Comparison among the qualitative variables were made by Pearson's X^2 (chi-square) test and, in case of non-validity of this test, by Fisher's exact bilateral test. For all statistical tests, a value of $p < 0.05$ was considered statistically significant. Informed consent (in Arabic or French) was obtained from each patient before the inclusion. The ethics committee of Habib Thameur Hospital agreed all patient enrollment and the study conduction.

Results

During the study period, 34 patients with IBS were enrolled.

Two patients were excluded after the diet (unreachable by phone for the control questionnaire).

- *Characteristics of the population*

Mean age was 56.5 years (21- 83) and 74% of our patients were female. Up to 26 % of cases were overweight while 29% were morbidly obese. IBS was evolving for more than 5 years in 44.1%. Before the diet, 23 of the patients had VAS values between 7 and 10/10 while 11 had values between 5 and 7/10. Over 58.8% of patients had type 1 stools according to the Bristol scale, 26.5% type 2 and 8.8% type 3. Thirty-three patients had abdominal bloating and distention while the other 30 patients presented dyspepsia before diet.

- *Results of the food survey*

Sixty percent of the patients did not consume gaseous water, 14.7% consumed it once a week, 8.8% consumed it twice a week and 8.8% very rarely. Sixty percent of patients consumed pasta once a week,76.4% of patients ate white bread daily. Thirty percent of patients did not consume oleaginous grains, 20.5% consumed it twice a week and 14% consumed rarely.

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Table 1: Foods tolerance

Foods	Tolerance (%)
Pasta	26.9
Fruits	29.4
Milk	32.4
Spicy	29.4
Pizza	26.5
Raw onion	76.5

- *Results of low FODMAP diet*

Adherence to low FODMAP diet was good in 97% of cases. More than 94% of patients reported feeling better overall after following the diet. The table 2 summarizes the comparison of IBS symptoms before and after low FODMAP diet.

Table 2: symptoms before and after low FODMAP diet

symptoms	Before diet n=34	After diet n=32	P
Abdominal pain (EVA) (mean±SD)	3,18±0,716	1,16±0,628	<0.0001
Bloating			
Yes	34	3	0.007
No	0	29	
Stools (Bristol scale)			
Type1	23	0	0.097
Type2	8	11	
Type3	3	16	
Type4	0	4	
Type5	0	1	
Dyspepsia			
Yes	30	1	<0.0001
No	4	31	
Distension			
Yes	70	52	0.007
No	22	2	

Discussion

The reduction in FODMAP sugar intake induces a reduction in the fermentation inside the bowel. That decreases the liquids arriving at the intestinal lumen by osmotic effect and colonic bacterial fermentation responsible of gas and volatile fatty acids production. The first study evaluating low FODMAP diet was Australian, conducted by Shepherd et al [3]. In our study, patients responded first to a food survey. They indicated that they ate bread (consumed by 60% at an average of one and a half sticks 2 to 3 times per day) and pasta (consumed by 60% once a week). They had no issues with cabbages, onions and fruits, but around 80% of patients avoided oilseeds and 60% indicated they had intolerance for vegetables because of bloating and distension. In the literature, patients often report a relationship between diet and IBS symptoms [4,5]. Several carbohydrates cannot be digested or absorbed by the human gut. In fact, the intestine does not contain the required enzymes for oligosaccharides decomposition. This causes their fermentation in the intestine and becoming source of nutrients for colon bacteria and this could explain the immediate effect of some foods on the symptom's onset. In a Swedish, 51% of patients reported that symptoms are directly related to some homemade meals. These foods are summarized in Table 3 [5].

The diet duration and adherence were variable in the previous studies but most of the authors preferred shorter periods. In Halmos's study, 80% of patients followed the diet correctly for 21 days [6]. The diet was prescribed for 15 months in another observational study from New Zealand [7]. In our study, adherence to low FODMAP diet was good at 97% for a period of 3 weeks. More than 90% of patients noted an overall improvement with decreased symptoms. In fact, 80% of patients had a change in stool consistency and 70% of patients had a VAS decrease of at least 2mm. In a randomized controlled cross-over American study, Chumptazi and al. demonstrated a reduction in pain episodes after low FODMAP diet [8]. In another randomized, crossover-controlled Australian study, the symptom score was significantly better with the FODMAP-poor diet than that of a typical Australian diet with a decrease in EVA pain value. The analysis demonstrated as well a significant decrease in diarrhea [9]. Staudacher and al. also found a decrease in bloating in the group following the low FODMAP diet (82% vs 49%) that confirmed the findings of many other studies [10]. More recently, a meta-analysis demonstrated a significant reduction in IBS symptoms specially the bloating in low FODMAP diet [11].

Confronting the low FODMAP diet and the usual IBS diet that consist in removing legumes, cauliflower, onions, over-spicy and over-fatty foods, some studies proved that the control of the symptoms was significantly superior in the low FODMAP groups [12,13]. A comparative study found similar results for gluten-free and low FODMAP diets and 71% of patients

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Table 3: IBS symptoms related foods

Food	%	Symptoms
Cream	37%	Diarrhea
Milk	30%	Bloating
Peas and beans	46%	Bloating /pain
Fried food	45%	Dyspepsia /pain
Pizza	44%	Dyspepsia/pain /diarrhea
Coffee	39%	GERD/ dyspepsia /diarrhea

claimed an objective decrease of IBS symptoms in the gluten-free diet [14]. Others interfering factors have been quickly considered in the management of IBS diet. The stress, the regularity of meal timing, the quality of food sources, and the underlying psychological status are affecting IBS symptoms considerably. Some other authors found out in a recent randomized study that the hypnosis is as efficient as the low-FODMAP diet in IBS symptoms control [15]. It remains to highlight the necessity of correct IBS diagnosis. Some IBS symptoms are close to celiac disease presentation and severe restrictions may lead to deficiencies and metabolic disorders [16-18]. The low FODMAP diet seems to be balanced and safe. The caloric intake from carbohydrates, fats and proteins for patients following low FODMAP diet was equivalent and enough as well as for folate, vitamin C and riboflavin [19,20]. The results depend usually more on the adherence to the dietary advice and the lifestyle management. In our study, 97% of patients adhered well to the diet. Some elements could however explain the low compliance. The lack of motivation in some patient not convinced by the effectiveness of the diet in the treatment [21,22]. According to them, drug treatment is always easier to follow. The busy lifestyle and multiple daily tasks beside the financial constraints may limit also the efficiency of the diet [22-24]. The usually undiagnosed altered psychological patient's status can major IBS symptoms and reduce the acceptance of alimentary restrictions. Paduano and al. proposed a balanced diet for IBS and showed that it improves quality of life as well as pain scales [25]. A recent metanalysis including 1726 IBS cases showed a mild superiority of the low FODMAP diet. That was partially explained by the variety of foods allowed in this diet [26]. The Tunisian alimentary habits are different and characterized by large consumption of white bread, pasta, fruits and legumes and fat. The low FODMAP first seemed to be difficult to implement in our patients. The education, patient's selection and progressive approach should be the keys to ensure best adherence. The low FODMAP diet appears to improve IBS symptoms such as bloating and transit disorders.

However, the support of a specialized dietitian and psychologist remains more than mandatory. The applicability of this diet has been studied in several countries with various gastronomic cultures. In Tunisia, the short-term results are satisfactory. However, long-term applicability needs to be worked out. Our results must be approved on a larger population study.

Conclusions:

The low FODMAP diet is becoming increasingly important in the treatment of IBS and appears to be very effective in the improvement of the IBS symptoms. This diet could support the therapeutic management and reduce the need to conventional drug treatments. However, it remains a food plan to ease symptoms for the patients and trigger responsible foods. The interference of multiple IBS related factors should be ruled out to assess properly the real value of the low FODMAP in patient's quality of life improvement.

Conflict of interest: none

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Appendix: literature review

Study	n	Type	Diet duration	Results
Paduano 2019 Italy [25]	42	Prospective	4 weeks	3% of preference for low-FODMAP diet, 11% for the gluten-free and 86% for the balanced diet p < 0.01
Eswaran 2016 USA [21]	42	Randomized controlled trial	4 weeks	40-50% of relief of IBS-D symptoms Greater improvement than mNICE diet
Chumptazi 2015 USA [8]	33	Randomized double blind crossing over	1 week	Less abdominal pain with low FODMAP diet vs. traditional diet [1.1 ± 0.2 (SEM) episodes/day vs. 1.7 ± 0.4, p < 0.05]
Pederson 2014 Danemark [12]	44	Crossing-over single blind	6 weeks	Réduction significative à l'échelle visuelle analogique de la douleur
Mazzawi 2013 Norway [22]	17	Case study	12 weeks	Improvement of life quality lower IBS score (41,47 ± 1.62/ 35,71 ± 1.12) p=0,001
Staudacher 2012 UK [23]	41	Randomized controlled trial	4 weeks	adequate control of symptoms in intervention group (13/19, 68%) compared with controls (5/22, 23%; p= 0.005)
Ong 2010 Australia[24]	30	Crossing-over single blind	2 days Low FODMAP (9g per day instead of 50g)	Higher levels of breath hydrogen produced Increased Gastrointestinal symptoms
Shepherd 2008 Australia [3]	25	Randomized double blind placebo controlled	22 weeks mixtures of FODMAPs	symptoms not well controlled with fructose (70%), fructans (77%), and mixture (79%) compared with 14% for glucose p = 0.002
Our study 2019 Tunisia	34	Longitudinal prospective	3 weeks	FODMAP applicable good adherence

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