ORIGINAL ARTICLE

Elimination of Dietary Triggers Is Successful in Treating Symptoms of Gastroesophageal Reflux Disease

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Abstract

Background The relationship between aliments and pathophysiological abnormalities leading to gastroesophageal reflux disease (GERD) symptoms elicitation is unclear. Nevertheless, patients often report symptoms after ingestion of specific foods.
Aims To identify in primary care setting the presence of foods able to trigger GERD symptoms, and evaluate whether a consequent specific food elimination diet may result in clinical improvement.
Methods Diagnosis of GERD and quantification of reflux symptoms were done according to GERD-Q questionnaire (positive when > 8). During clinical data collection, patients were asked to report aliments associated with their symptoms. Also, a precompiled list of additional foods was administered to them. Then, patients were requested to eliminate the specific foods identified, and to come back for follow-up visit after 2 weeks when GERD-Q questionnaire and clinical data collection were repeated.
Results One-hundred GERD (mean GERD-Q score 11.6) patients (54 females, mean age 48.7 years) were enrolled. Eighty-five patients reported at least one triggering food, mostly spicy foods (62%), chocolate (55%), pizza (55%), tomato (52%), and fried foods (52%). At follow-up visit, the diagnosis of GERD was confirmed in only 55 patients, and the mean GERD-Q score decreased to 8.9. Heartburn reporting decreased from 93 to 44% of patients, while regurgitation decreased from 72 to 28%. About half of the patients agreed to continue with only dietary recommendations.
Conclusions Most patients with GERD can identify at least one food triggering their symptoms. An approach based on abstention from identified food may be effective in the short term.

Keywords Gastroesophageal reflux disease · Primary care · Food · Symptoms · Heartburn · Regurgitation

Background

The presence of typical symptoms (i.e. heartburn and regurgitation) of gastroesophageal reflux disease (GERD) is very common in the general population, pertaining about 20–25% of the individuals in Western Countries [1, 2]. Thus, a relevant number of these subjects do consult their General Practitioner, particularly when their symptoms influence their daily life [3]. The main mechanism involved in symptom elicitation is represented by the inappropriate relaxation of the lower esophageal sphincter with consequent migration of gastric contents into the esophagus [4, 5], but

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others features have been involved in the pathogenesis of this disease, including poor esophageal clearance and visceral hypersensitivity (6–9).

Various risk factors have been associated with GERD, and above all, diet seems to play a major role [10–14]. However, studies are generally inconclusive to show a clear association between the ingestion of particular aliments and the occurrence of specific pathophysiological abnormalities [12, 15]. Nevertheless, patients often report the rising of reflux symptoms after the ingestion of specific alimentary foods [1, 16–24]. For this reason, in presence of typical symptoms, it is generally recommended to reduce the intake of such foods, for instance, orange, mint, chocolate, suspected to facilitate the symptomatology. This is usually done empirically, but the right and timely identification of these foods may positively impact on reflux disease presence and severity, and it could be also useful in reducing the pharmacological exposure of this population. Indeed, patients with symptoms of GERD often start therapies with powerful suppressors of acid gastric secretion, that are difficult to reduce and stop [25].

The aim of the present study was to identify the presence of foods able to elicit typical symptoms of GERD, and to verify whether a consequent diet modification (i.e. specific food elimination diet) may result in clinical improvement in GERD patients evaluated in primary care setting.

Methods

Patients

This was a prospective study, carried out between March and October 2019 in twelve General Practitioner outpatients' clinics, each enrolling consecutive adult patients presenting for the first time with typical symptoms of GERD. Diagnosis of GERD and quantification of symptoms were done according to GERD-Q questionnaire that has been validated for both diagnosis and follow-up of reflux disease patients in primary care [26, 27]. In particular, the GERD-Q questionnaire evaluates symptoms occurring in the last week and it is included in the professional software that General Practitioners use for the routine management of the patients. Individuals with a GERD-Q score higher than 8 were enrolled in the study [26, 27]. Patients with known GERD and/or alarm (including dysphagia and chest pain) symptoms and/or dominant extraesophageal symptoms, as well as patients in therapy with antisecretory drugs for non-GERD reasons (i.e. gastroprotection and dyspepsia) or previously submitted to esophagogastroduodenoscopy were excluded. The recruitment of the study was considered completed upon receipt of the hundredth patient enlisted. According to Italian law,

observational questionnaire-based studies with all the data de-identified prior to analysis do not require IRB or EC approval. The study was carried out in accordance with the Helsinki Declaration.

The study was carried out as part of routine evaluation of the patient. A complete clinical history was collected, including demographics (race, age, gender), body mass index, medical records, and ongoing treatments. In these subjects, General Practitioners after having checked and recorded in a professional database demographic and anthropometrical data, noted in the individual chart every food that the patient spontaneously related to typical GERD symptom occurrence. Moreover, additional foods were annotated by General Practitioners asking the patients to look at a precompiled list including foods not reported spontaneously by patients (Table 1). This list of possible dietary triggers was compiled based on previous studies [1, 12, 20, 22, 30, 33], considering also the eating habits in Italy.

At the end of the first visit, each patient was asked to eliminate from the diet the foods identified, and to come back for follow-up visit after 2 weeks. In this period, patient did not assume antisecretory drugs, but the use antacids or medical devices on demand was allowed by the study protocol. During the follow-up visit, after 2 weeks, the GERD-Q questionnaire was administered again and was recorded in the database, together with the statement on the eventual removal of GERD triggering food and the outcome with respect to prescription of drugs (gastric acid suppressive drugs or antacids), endoscopy and/or specialist consultation.

Table 1 List of foods specifically subjected to the patient after him/her has spontaneously reported the foods related to his/her occurrence of typical GERD symptom

Alcoholic drinks
Chocolate
Citrus fruits
Coffee
Cucumbers
Fatty foods
Fried foods
Lettuce
Meat broth
Milk
Peppermint
Peppers
Pizza
Processed meat
Sauces
Soft drinks
Sparkling water
Spicy foods
Tea
Tomato

Statistical Analysis

Data anonymously extracted by the clinical file of the patients were collected in order to create a single database. Results are reported as absolute frequency and percentage or mean and standard deviation. At univariate analysis, continuous and categorical variables were evaluated with the Student t test and Chi-squared test. The Kolmogorov–Smirnov test was used to assess the normality of data. Results were considered statistically significant when p value was lower than 0.05. Analyses were performed using Stata software (StataCorp LLC, USA).

Results

Overall, 100 patients, whose demographic characteristics are reported in Table 2, were included into the study. Fifty-four were females, with a mean age of 48.7 years and with a mean body mass index of 24.8 kg/m2. Table 3 reports the results of the GERD-Q Questionnaire administered at the first visit. The mean value of the GERD-Q score was 11.6 (range 9–17). None of the 100 patients reported alarm

symptoms at baseline, as per inclusion criteria, requiring investigation with upper endoscopy.

Correlation Between Foods and Symptoms at Baseline

Eighty-five patients reported spontaneously at least one triggering food they believe to cause their typical reflux symptoms, whereas 88 patients reported at least one specific aliment after the use of the precompiled list. Overall, all patients reported at least one food. Table 4 shows the foods identified by the patients with the percentage of the patients recording it. The foods more frequently associated with typical reflux symptoms resulted: spicy foods (62%), chocolate (55%), pizza (55%), tomato (52%), fried foods (52%), alcoholic drinks (50%), citrus fruits (48%), sauces (48%), coffee (41%), processed meat and fatty foods (34%). To note, 70 patients reported to be already informed of the possible benefit of excluding these foods from the diet and 54 patients reported an attempt to cut out them from the alimentay habits.

Correlation Between Foods and Symptoms After the Specific Food Elimination Diet

At follow-up visit, after 2 weeks, again, none of the 100 patients reported alarm symptoms. Only 1% of patient declared not to being able to eliminate the identified triggering food, whereas 46% reported to have completely eliminated from the diet the triggering food and, finally, 53% suspended it only partially (between 50 and 75% of the meals). Table 5 shows the results of the GERD-Q Questionnaire administered at follow-up visit. The mean GERD-Q score was 8.9 (range 3–17) and decreased 23.3% between the first and the follow-up visit. Thus, as illustrated in Fig. 1, GERD-Q score resulted positive for the diagnosis of GERD in 55 patients compared to 100 patients at baseline ($p = 0.001$). Figure 1 shows the rate of patients complaining of heartburn and regurgitation with

Table 2 Demographics and risk factors of the 100 patients included in the study

Features		
Sex	Males	46
	Females	54
Age	Median	48.7 years
	Range	18–83 years
Body mass index	Median	24.8 kg/m^2
	Range	18.0–38.8 kg/m^2
Smokers	Never	57
	Past	5
	Current	38
Alcoholic drinks	Never	26
	Non-daily intake	62
	Daily intake	10

Table 3 Results of the GERD-Q Questionnaire administered at the first visit (100 patients)

Item	Never n (score)	1 day n (score)	2–3 days n (score)	4–7 days n (score)	Mean score (SD)
Heartburn	3 (0)	4 (1)	55 (2)	38 (3)	2.3 (0.7)
Regurgitation	9 (0)	19 (1)	47 (2)	25 (3)	1.9 (0.9)
Epigastric pain	7 (3)	19 (2)	35 (1)	39 (0)	2.1 (0.9)
Nausea	18 (3)	8 (2)	16 (1)	65 (0)	2.4 (1.0)
Difficulty to have night sleep due to heartburn or regurgitation	23 (0)	31 (1)	26 (2)	20 (3)	1.4 (1.1)
OTC medication for heartburn or regurgitation	30 (0)	15 (1)	25 (2)	30 (3)	1.6 (1.2)
Mean total score					11.6 (2.2)

Table 4 Frequency of spontaneous reports, as a result of a specific request and the total frequency of foods triggeing GERD symptoms in 100 patients

Food	Spontaneous report (%)	After specific request (%)	Total
Spicy foods	41	21	62
Chocolate	37	18	55
Pizza	28	27	55
Tomato	27	26	53
Fried foods	43	28	52
Alcoholic drinks	33	17	50
Citrus fruit	27	21	48
Sauces	19	29	48
Coffee	19	22	41
Processed meat	13	21	34
Fatty foods	13	9	34
Meat broth	19	9	28
Peppermint	8	19	27
Sparkling water	9	17	26
Milk	12	6	18
Cucumbers	6	9	14
Peppers	5	8	13
Soft drinks	5	6	11
Lettuce	6	3	9
Others *	26		

*Red meat (4%); walnuts (3%); cabbages, licorice, onions (2%); potatoes. ice cream, garlic, pickles, beans, artichokes, olives, tea, legumes, almonds, chestnuts (1%)

a score > 1 (presence of symptoms more than 1 day in the week). The frequency of heartburn scoring > 1 decreased from 93 to 44% ($p = 0.001$), while the frequency of regurgitation scoring > 1 decreased from 72 to 28% ($p = 0.001$). Figure 2 shows the difference in the mean score for heartburn and regurgitation between the two consultations. The score of heartburn decreased from 2.3 (SD 0.7) to 1.3 (SD

0.9) ($p = 0.001$), while the score of regurgitation decreased from 1.88 (SD 0.9) to 0.97 (SD 1.0) ($p = 0.001$).

After the follow-up consultation the following outcomes were observed: 45% of patients have agreed to continue only following the dietary recommendations, whereas 55% of patients started a pharmacological treatment as follows: 39 (70.9% of treated patients) patients with PPI once daily, 6 (10.9% of treated patients) with H2 receptor antagonists once daily, and 10 (18.2% of treated patients) with alginate (6 of these in combination with antisecretory drugs). None of the patients was sent to a gastroenterlogy specialist.

Discussion

There has been speculation for many years about the concept that certain dietary and lifestyle factors may play a role in the pathogenesis or course of GERD. However, a wide-ranging review of the available data reveals conflicting findings regarding the impact of most of these factors. In addition, the majority of the studies concerned about the small numbers of patients included, the retrospective design, the lack of use of validated questionnaires for GERD assessment, the unclear duration of the follow-up, and because they did not evaluate concomitant therapy with PPIs and antacids.

Consequently, any advice given on modifying diet and/or lifestyle in the management of GERD represents a form of empirical therapy. Thus, this study was carried out in subjects presenting for the first time to their General Practitioner because of symptoms of GERD without alarm signs, to assess whether it was possible to identify triggering foods by means of the General Practitioner interview and the administration precompiled list of potential triggering aliments. We showed that patients are able to identify at least one food which is considered to cause their symptoms, with an increased detection by using a precompiled list of potential triggering foods. Moreover, after 2 weeks of specific food elimination diet according to the results of the

Table 5 Results of the GERD-Q Questionnaire administered at the control visit ($n = 100$ patients) after the elimination of the triggering food from the diet

Item	Never n (score)	1 day n (score)	2–3 days n (score)	4–7 days n (score)	Mean score (SD)	Significance vs initial visit
Heartburn	19 (0)	37 (1)	37 (2)	7 (3)	1.3 (0.9)	< 0.001
Regurgitation	39 (0)	33 (1)	20 (2)	8 (3)	1.0 (1.0)	< 0.001
Epigastric pain	3 (3)	12 (2)	28 (1)	57 (0)	2.3 (0.8)	NS
Nausea	7 (3)	5 (2)	13 (1)	75 (0)	2.6 (0.9)	NS
Difficulty to have night sleep due to heartburn or regurgitation	62 (0)	22 (1)	14 (2)	2 (3)	0.6 (0.8)	< 0.001
OTC medication for heartburn or regurgitation	45 (0)	17 (1)	20 (2)	18 (3)	1.1 (1.2)	0.031
Mean total score					8.9 (2.9)	< 0.001

NS as not significant

Fig. 1 Diagnosis of GERD according the GERD-Q questionnaire (score > 8) and frequency of patients scoring > 1 (presence of symptoms > 1 day in the week) for heartburn and regurgitation at the first consultation and at the control visit
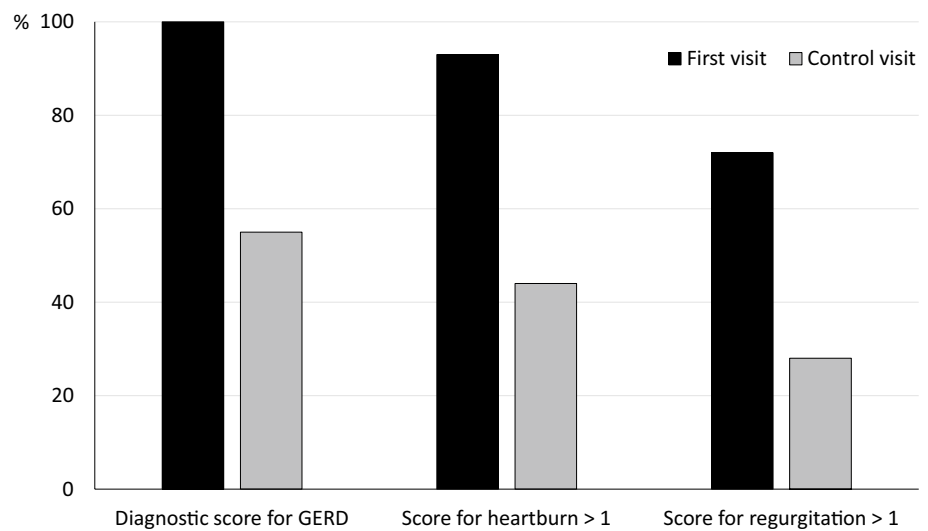
Fig. 2 Mean score for heartburn and regurgitation in the first consultation and at the control visit after 15 days
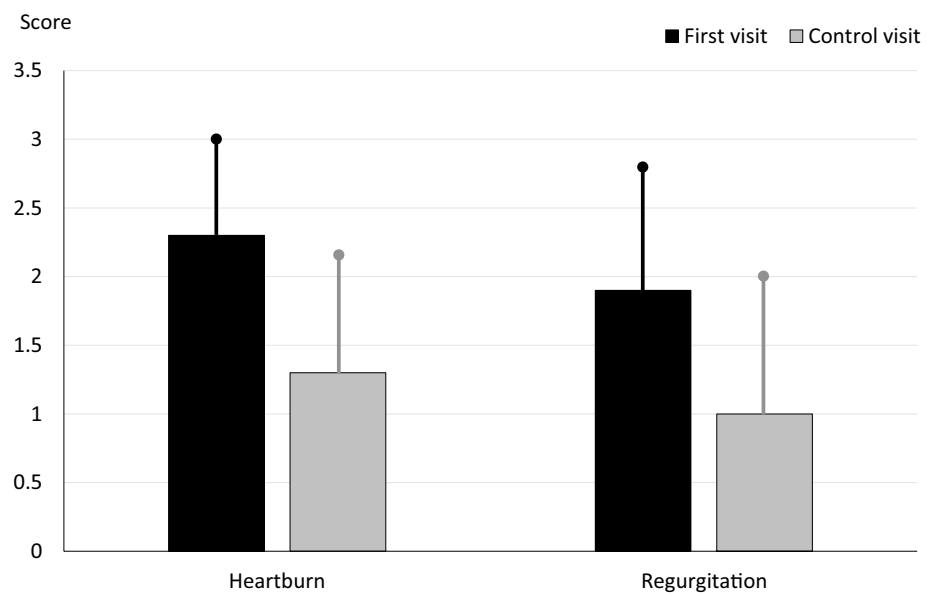
questionnaire, about half of the patients obtained such a benefit to not require the start of a pharmacological therapy or to undergo further investigations.

Foods causing GERD symptoms identified by our patients are quite varied and mostly correspond to what has been reported in previous studies, in which the foods involved vary according to the patient's food habits and the country in which they live [20]. Anyway, patients' ability to recognize exacerbating food symptoms has been demonstrated by investigations in different countries such as Korea [21] and Tanzania [30]. Although the different studies do not show univocal results, most of the available data substantially identify the following foods as exacerbating reflux symptoms: fried foods [16, 18, 20–22], spicy foods [1, 16–18, 20, 21, 30], fatty foods [19, 24] and tomato [20, 22, 30].

In contrast, data on coffee consumption are mixed [1, 21, 23, 28, 31, 32], similar to tea [22, 23, 28, 32, 33], citrus fruit [20, 22] and even alcoholic beverages [1, 16, 20, 22, 28–30]. Data on foods normally cited in dietary recommendations such as chocolate and peppermint [20] are surprisingly scarce.

The results of the studies that have tried to associate certain foods to specific pathophysiological alterations able to explain the onset of symptoms of GERD are generally poorly significant [15, 34]. High-fat meals increase the esophageal acid exposure as assessed by reflux monitoring in reflux patients with and without esophagitis [24], reduce the resting pressure of the lower esophageal sphincter and prolong the time of gastric emptying [35]. Animal fats and proteins seem to increase acid secretion and gastrin levels

[36], whereas chocolate is considered a food capable of reducing the tone of the lower esophageal sphincter [15, 37]. A study carried out in 15 patients by means of pH impedance monitoring and comparing in the same patient the effects of a meal with a high rate of animal proteins and those of a meal with a high rate of vegetable proteins showed that the meal rich in animal proteins was followed by a greater number of total and acid refluxes [38]. Finally, it has been shown that the frequency of GERD is lower in individuals following predominantly a Mediterranean diet (frequent consumption of composite/traditional dishes, fresh fruit and vegetables, olive oil, and fish) compared to those following largely non-Mediterranean diet (frequent consumption of red meat, fried food, sweets, and junk/ fast food) [39].

More consistent are the data that associated the presence of GERD with overweight and obesity [12, 15, 40–42] rather than the different components of the patients' diet, and, to confirm, there are studies observing that weight loss is effective in reducing symptoms and PPI use in GERD patients [12, 43, 44]. In our study, the mean BMI of the patients was at the upper limit of the international normal range and, given the short time follow-up study, it is difficult to hypothesize that the results on the GERD symptoms, in absence of a structured diet, were due to a possible modest weight reduction rather than the elimination of one or more specific foods. However, the lack of solid evidence between specific foods and pathophysiologic alterations of the esophagus cannot disregard the importance of clinical observations reported by the patients.

Our study has some limitations. The short follow-up time, due to the desire to adapt the General Practitioners behavior to daily practice as much as possible, does not allow to know the duration over time of the symptomatic results achieved. Also in order to carry out a study whose results can be easily reused in the daily practice, specific questionnaires on quality of life were not used. Similar, a structured diet program was not set in overweight or obese patients. Studies show that only 12% of GERD patients received documented counseling on lifestyle modifications [45], while it has been demonstrated that a dietitian's first gastroenterology model of care helps improve patient flow, reduces wait times and may be useful elsewhere to address outpatient gastroenterology service pressures [46]. The same considerations apply to cigarette smoking, a factor has been considered favoring reflux symptoms [1, 28, 29].

In conclusion, our study shows that a large number of GERD patients are able to identify at least one food triggering their symptoms and that an initial therapeutic approach based on abstention from identified food may be effective in the short term. Prospective and controlled studies designated for longer periods and with a greater number of subjects are mandatory to define whether this approach could determine a lower exposure of patients to pharmacological therapies, particularly in the long-term.

Compliance with Ethical Standards

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