



## The role of lifestyle changes in gastroesophageal reflux diseases treatment

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### ABSTRACT

Lifestyle modification has an important role in the treatment of gastroesophageal reflux disease (GERD). The development of GERD symptoms with various foods shows individual differences. Although there is not enough evidence that certain substances in a diet could lead to GERD symptoms, the literature suggests that there might be a relationship between reflux development and salt, salted foods, chocolate, fatty foods, and fizzy drinks. Because lying on the left side and raising the head of the bed in a supine position reduces the development of nocturnal reflux symptoms, the head should be elevated for patients with reflux symptoms at night, and the patient should lie on the left side. Smoking and obesity (especially abdominal) trigger GERD symptoms. Whereas excessive physical activity is a significant risk factor for the development of GERD, regular and mild-moderate physical activity has been shown to reduce the symptoms of reflux.

**Keywords:** Lifestyle, modification, reflux

### DOES A REDUCTION OCCUR IN THE SEVERITY AND DEVELOPMENT OF GASTROESOPHAGEAL REFLUX SYMPTOMS OR IN THE DEVELOPMENT OF COMPLICATIONS WITH A DIET CHANGE?

There is a general view that various foods cause the GERD symptoms or increase these symptoms. In daily clinical practice, suspected foods are often restricted. The presence of GERD symptoms frequently in the postprandial period suggests that diet is an important factor for development of these symptoms (1). However, in the literature, there are conflicting results about which foods increase reflux.

Although Nebel et al. (2) have demonstrated that fried foods, spicy foods, and alcohol are the foods that most precipitate heartburn, the lack of a control group in this study, and that the amount of consumption of these food products is not specified, raises question marks. No significant results could be obtained in the epidemiological large-population study in which Ruhl et al. (3) investigated the relationship between erosive esophagitis and fat-rich diets. However, in the study conducted by Shapiro et al. (4), reflux episodes were observed

more frequently in patients eating fat-rich foods. Similarly, in the large-scale case-control study of El-Serag et al. (5), the relationship between the total fat amount consumed daily and both non-erosive reflux disease and erosive esophagitis was documented. Shapiro et al. (4) showed that cholesterol and saturated fatty acid-rich diets and a high ratio of daily calorie consumption increased the risk of episodes.

In the large-population epidemiological study of Zheng et al. (6), no relationship could be detected between reflux and the consumption of vegetables, fruits, fish, meat, rice, bakery products, milk, sandwiches, potato, and fried or grilled food.

In the case-control study conducted by Nilsson et al. (7) with more than 40,000 people regarding the use of alcohol, no relationship could be detected between alcohol intake and reflux symptoms. In another large-population case-control study, El-Serag et al. (5) could find no relationship between the total amount of alcohol consumed daily and erosive or non-erosive GERD development. In the study in which they investigated

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the reflux inducing effects of various foodstuffs, Shapiro et al. (4) showed that alcohol use did not increase the risk of reflux episodes (OR: 0.26, CI: 0.05-1.3).

Zhang et al. (6) have indicated that, as in alcohol consumption, there is no relationship between the development of reflux symptoms and coffee consumption. Nilsson et al. (7) have determined that even more than 7 cups of coffee per day does not cause an increase in the risk of GERD symptoms development. In the case-control study of Boekema et al. (8), it has been indicated that coffee does not increase the duration of postprandial acid reflux and the number of reflux episodes. In addition, it has been shown that coffee has no influence on postprandial lower esophageal sphincter pressure.

The relationship between salt intake and the development of reflux symptoms has also been documented in various publications. In large-scale population-based studies, consumption of salted fish or meat twice a week has been shown to be a risk factor for the development of reflux symptoms (OR: 1.3, CI: 1.1-1.5). The same study has also documented that adding extra salt to food increases the risk of reflux symptoms development (7).

There is evidence suggesting that a fiber-rich diet is an important protective factor from reflux development. In the population-based study of Nilsson et al. (7), a decrease was observed in the development of reflux in patients consuming fiber more than 4%, and this risk was observed to further decrease as the amount of fiber consumption increased. Furthermore, it is concluded that increasing the intake of fiber in a diet reduces the risk of esophageal adenocarcinoma associated with reflux (9).

There is an old study reporting that chocolate reduces the basal pressure of lower esophageal sphincter. In the 1988 dated study of Murphy and Castell (10), increased esophageal acid reflux was confirmed through esophageal pH monitoring after chocolate consumption. In the result of our systematic review of the literature, no clinical study investigating the relationship between chocolate and reflux was found other than this study. There are a limited number of data suggesting that fizzy drinks can also lead to reflux symptoms in addition to chocolate. Fass et al. (11) observed in their multivariate analysis that the consumption of carbonated soft drinks increased nocturnal reflux symptoms.

The consumption rapidity of foods is another risk factor for the development of gastroesophageal symptoms (12). In the study conducted by Wildi et al. (13), among the people consuming a certain amount of a meal in 5 minutes and 30 minutes, the median number of refluxes was found higher in the fast-eating group in a post-prandial period of more than two hours (14 vs. 10,  $p=0.02$ ).

#### RECOMMENDATIONS

- There is not enough evidence in the studies in order to justify that a variety of foods can affect reflux (Level of evidence: 2b).
- There is data suggesting that there could be a correlation between reflux development and salt, salted foods, chocolate, fatty foods, and fizzy drinks (Level of evidence: 2b).
- Low-volume, frequent and slow eating\* should be advised (Level of evidence: 5, Level of evidence: 3b\*).
- Consumption of fibrous foods should be recommended (Level of evidence: 2b).
- The development of GERD symptoms with various foods shows individual differences. Therefore, there is a need for large-scale randomized trials showing whether or not there is an improvement in reflux symptoms in the case that the potential risk factor foods for an individual are removed from the diet (Level of evidence: 5).

#### DOES A DECREASE OCCUR IN THE DEVELOPMENT AND SEVERITY OF GASTROESOPHAGEAL REFLUX SYMPTOMS OR IN THE DEVELOPMENT OF COMPLICATIONS WHEN THE REQUIRED POSTURE CHANGE IS MADE?

There is a variety of data suggesting that lying positions may affect the development of GERD symptoms. The effect of gravity on the clearance of acidic and non-acidic stomach contents, and the proceeding of reflux fluid in the esophagus towards more proximal locations (remaining longer while lying in the supine position) are responsible for acid reflux being more damaging at night (14). Moreover, lying on the right side has been shown in various publications to enhance the effect of reflux. Though the mechanism has not been fully explained yet, increased temporary relaxations of the lower esophageal sphincter in the right lateral position are indicated to be responsible for this situation. Lying in the left lateral position is known to locate the gastroesophageal junction above the level of stomach acid (15).

In the study of Khoury et al. (16) in which they investigated the relationship between the spontaneous sleeping position and nocturnal reflux episodes, reflux incidence was determined lower in those sleeping prone and in the left lateral position than those sleeping in the right lateral and supine positions. Moreover, the clearance of acid has been shown in this study to be more evident in prone and left lateral positions. In a study in which 15 patients known to have symptomatic GERD were examined through 24-hour pH monitoring measurements, number of reflux episodes and total acid exposure duration were shown to be higher in those lying in the right lateral position than those lying in the left lateral position (17). In the study of Katz et al. (18), total reflux time (231 minutes vs. 117 minutes,  $p<0.05$ ) and acid clearance time (0.77 minutes vs. 0.29 minutes  $p<0.001$ ) were also found higher in those sleeping in the right lateral position than those sleeping in the left lateral position.

In a study in which the effect of raising the head of the bed in patients with nocturnal reflux symptoms was investigated, a significant decrease was found in reflux time, determined in the supine position, acid clearance time, and the quantity of reflux lasting longer than 5 minutes in 24 patients whose bed head position was elevated 20 cm with a 20 cm block for 6 days (19). In the study of Johnson and DeMeester (20), an improvement of 67% was observed in acid clearance time in patients sleeping with an elevated bed head position ( $p < 0.025$ ).

#### RECOMMENDATIONS

- An increase is observed in nocturnal reflux symptoms when lying in the supine and right lateral positions (Level of evidence: 3b).
- Lying in the left lateral position and elevating the bed head while in a supine position reduces the development of nocturnal reflux symptoms (Level of evidence: 3b).
- The bed head position should be raised for those having reflux symptoms at night and the patient should lie in the left lateral position (Level of evidence: 3b).

#### DOES A REDUCTION OCCUR IN THE SEVERITY AND DEVELOPMENT OF GASTROESOPHAGEAL REFLUX SYMPTOMS OR IN THE DEVELOPMENT OF COMPLICATIONS IF SMOKING CEASES?

Although there are publications suggesting that smoking has an aggravating role in GERD pathogenesis, the mechanism of this effect has not yet been clarified. It has been shown in various studies that an abrupt decrease occurs in lower esophageal sphincter pressure during smoking. In these studies, it was found that the lower esophageal sphincter pressure completely returned to normal 5-8 minutes after smoking ceases (21,22).

It has been demonstrated in many large-scale clinical studies that there is a relationship between GERD and smoking. In a large-scale population-based study of Nilsson et al. (7), smoking 6 or more cigarettes a day was shown to be an independent risk factor for GERD development. It was also revealed that the increase in the number of cigarettes smoked per day was directly proportional to the increase in risk. In the study of Zheng et al. (6) in which they investigated the relationship between the lifestyle factors and GERD in monozygotic twins with over 25,000 participants, the increase in risk was found to be 37% in actively smoking women and 53% in men; and it was documented that this risk increase was dose dependent. In another population-based study, smoking cigarettes has been identified as a risk factor for GERD development. As well, it was shown to lead to the development of more severe symptoms in patients with GERD (23). In their population-based study with over 4000 participants, Watanabe et al. (24) showed that active smoking was an independent risk factor for GERD development (OR: 1.35, CI: 1.01-1.82). Schindlbeck et al. (25) found more reflux episodes in cigarette smokers than non-smokers, but neither smoking history nor being an active smoker had an effect on esophageal acid exposure time.

#### RECOMMENDATIONS

- Depending on the amount, smoking is a risk factor for the development of GERD symptoms (Level of evidence: 2b).

#### DOES A DECREASE OCCUR IN THE SEVERITY AND DEVELOPMENT OF GASTROESOPHAGEAL REFLUX SYMPTOMS OR IN THE DEVELOPMENT OF COMPLICATIONS IN THE CASE OF WEIGHT LOSS?

The relationship between obesity and GERD development has been documented in many experimental and clinical studies. Increased abdominal pressure in obese patients, impaired gastric emptying, decreased lower esophageal sphincter pressure, and increased temporary lower esophageal sphincter relaxations are all held responsible for GERD triggered by obesity (26,27).

In the meta-analysis of Hampel et al. (28), examining the risk factors for GERD and its complications, as a result of the analysis of eight studies on obesity, the Odds Ratio for GERD development was calculated to be 1.43 (1.158-1.734) in overweight patients (body mass index (BMI): 25-30 kg/m<sup>2</sup>) and to be 1.94 (1.468-2.566) in obese patients (BMI > 30 kg/m<sup>2</sup>). In another meta-analysis investigating the relationship between obesity and erosive esophagitis, being overweight (OR: 1.60, CI: 1.35-1.88) and obese (OR: 2.05, CI: 1.65-2.55) was shown to cause a significant increase in the risk for erosive esophagitis development (29).

There are publications revealing that, in addition to obesity, abdominal visceral adipose tissue volume is also associated with the development of GERD. In the result of multivariate analyses, Nam et al. (30) identified 1.97-times risk increases (CI: 1.34-2.90) for the development of erosive esophagitis in patients with a visceral adipose tissue volume of 500-999 cm<sup>3</sup> in 5329 patients. This risk increased to 2.94-times (CI: 1.87-4.62) in patients with the visceral adipose tissue  $\geq 1500$  cm<sup>3</sup>. As a result of multivariate analysis, Lee et al. (31) showed that obesity caused 2.12-times risk increase ( $p=0.04$ ), waist/hip ratio over 0.9 caused a 2.11-times risk increase ( $p=0.04$ ) and visceral adipose tissue area more than 137.35 m<sup>2</sup> caused a 3.23-times risk increase ( $p=0.003$ ) for erosive esophagitis.

Losing weight has been indicated to improve the symptoms of GERD in two separate studies. In the study of Sakaguchi et al. (32), weight gain was defined as gaining 2 kilos in the last 2 months and losing weight was defined as losing 2 kilos in the last 2 months. According to this definition, a higher prevalence of GERD was determined in those who gained weight in the end of 2 months in comparison to those with no weight change or who lost weight in the end of 2 months ( $p < 0.005$ ). In another recent study, 332 patients were included in a weight-loss program and at the end of 6 months; weight loss (mean 13 kg) was identified in 97% of the cases. In these cases, a reduction in GERD prevalence (15% vs. 37%;  $p < 0.01$ ) compared

to baseline, significant improvement in mean scores of GERD symptoms (1.8 vs. 5.5;  $p < 0.01$ ), a complete resolution of GERD symptoms in 65% of the patients, and a partial resolution in 16% of the patients were observed (33).

#### RECOMMENDATIONS

- Obesity, abdominal obesity, and increased adipose tissue are important risk factors for the development of GERD (Level of evidence: 2a).
- Obesity is an important risk factor for GERD and weight loss is recommended in patients with GERD (Level of evidence: 2a).

#### DOES REGULAR PHYSICAL ACTIVITY REDUCE THE SEVERITY AND DEVELOPMENT OF GASTROESOPHAGEAL REFLUX SYMPTOMS OR THE DEVELOPMENT OF COMPLICATIONS?

Depending on the intensity of physical activity, different results about the relationship between physical activity and GERD have been reported. Although it has been shown in various studies that excessive exercise can induce reflux, there are studies suggesting that no increase occurs in GERD symptoms with medium or mild exercise; moreover, mild and routine physical activity prevents reflux symptoms (7,22,34,35).

Clark et al. (34) identified a relationship between GERD and exercises such as running, cycling, and weight lifting. In different case-control, population-based, or randomized-controlled studies that were published after this study, intensive exercise was also reported to be associated with the development of GERD symptoms (6,36,37). It has been suggested that excessive physical activity causes an increase in reflux symptoms by increasing the transient relaxations of the lower esophageal sphincter (37). In the study that Zheng et al. (6) conducted in monozygotic twins, while the intensive physical activity during work caused more frequent GERD symptoms, a decrease in reflux symptoms was observed with less intensive physical activity that was done at rest time. It was highlighted by the authors that this difference could be associated with the reason that the physical activity done at work is a post-prandial exercise. Besides, in the same study, mild and off-the-job physical activity was shown to make a significant reduction in GERD symptoms in comparison to doing no physical activity. In the large-population study of Nilsson et al. (7) as well, it had been indicated that the physical activity that is done once a week or more, and lasts longer than 30 minutes, significantly reduces the risk of GERD. Nilsson et al. (7) argued that a 30-minute physical exercise that is done at least once a week reduces the GERD symptoms by causing the strengthening of the crural diaphragm, which is a component of an anti-reflux barrier. Nocon et al. (23) showed that doing physical activity more than twice a week provided a significant decrease in the prevalence of moderate or severe GERD symptoms (OR: 0.75, CI: 0.60-0.93).

#### RECOMMENDATIONS

- Excessive physical activity is an important risk factor for the development of GERD (Level of evidence: 2a).
- Reflux symptoms are seen less frequently in individuals with regular and mild-moderate physical activity (Level of evidence: 2b).

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