ORIGINAL ARTICLE

The effect of the speed of eating on acid reflux and symptoms of patients with gastroesophageal reflux disease

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Background/aims: *There is a general belief that gastroesophageal reflux attacks appear more frequently after quick meal, which is without powerful scientific basis, and the general advise to patients is to eat slowly. We aimed to determine whether the speed of eating has an impact on reflux attacks and symptoms in gastroesophageal reflux disease patients.* **Materials and Methods:** *24-h intraesophageal pH monitoring was performed to 60 patients with frequent gastroesophageal reflux disease symptoms (39 women) in a tertiary referral center. One hour after placing the pH probe, the patients were asked to have the same meal (744 kcal: 37,6% of carbohydrate, 21,2% of protein, and 41,2% of fat) within 5 or 30 minutes in random order for two consecutive days without extubating. The number of reflux episodes, acid exposure time, and the symptoms of 3-h postprandial period were analyzed.* **Results:** *Thirty-eight patients had normal and 22 patients had pathologic pH monitoring for a total of 28 hours of measurement period. The number of reflux episodes increased in the 2nd hour. The fast eating group had less reflux attacks and lower total reflux time in the 1st hour and an insignificant increase in the 2nd and 3rd hours. The number of symptoms was higher following slow eating (113 vs. 100) without reaching significance.* **Conclusion:** *Speed of food intake has no significant impact on acidic reflux attacks in patients with gastroesophageal reflux disease. The classical advice "eat slowly" may not have any scientific basis. However, a similar study on patients with gastroesophageal reflux disease should be performed by combined multichannel intraluminal impedance and pH to evaluate the place of nonacid or weak acid reflux.*

Key words: Gastroesophageal disease, intraesophageal pH, eating speed

Gastroözofageal reflü hastalarında yemek yeme hızının asit reflüsü ve semptomlarına etkisi

Giriş ve Amaç: *Gastroözofageal reflü ataklarının hızlı yenilen yemek sonrası arttığına inanılmakta ve hastalara yavaş yemeleri önerilmektedir. Kuvvetli bir bilimsel veriye dayandırılmasa da bu inanış temel alınarak hastalara yavaş yemek yemeleri önerilmektedir. Yemek yeme hızının gastroözofageal reflü hastalarında reflü ataklarına ve semptomlarına etkisini değerlendirmeyi amaçladık.* **Gereç ve Yöntem:** *Gastroözofageal reflü hastalığı semptomlu 60 hastaya (39 kadın) 24 saatlik intraözofageal pHmetri uygulandı. pH probunun yerleştirilmesinden 1 saat sonrasında hastalardan aynı öğünü (744 kkal: %37,6 karbonhidrat, %21,2 protein ve %41,2 yağ) 5 veya 30 dakika içerisinde art arda 2 gün rastgele sıra ile olacak şekilde yemeleri istenmiştir. Reflü sayısı, aside maruz kalınan süre ve yemek sonrasındaki 3 saatlik süredeki semptomları analiz edilmiştir.* **Bulgular:** *Toplam 28 saatlik ölçüm periyodunda 38 hastada normal, 22 hastada patolojik intraözofageal pHmetrik ölçüm izlendi. İkinci saatte reflü sayısında artış meydana geldi. Hızlı yemek yiyen grupta 1. saatte daha az sayıda reflü atağı meydana gelirken, total reflü zamanı da daha düşüktü. Bu grupta, 2. ve 3. saatlerde bu değerlerde anlamlı olmayan bir artış gözlemlendi. Yavaş yemek yeme sonrasında semptom sayısı arasında (113'e 110) anlamlı bir fark gözlenmedi.* **Sonuç:** *Gastroözofageal reflü hastalarında yemek yeme hızının asidik reflü ataklarına anlamlı bir etkisi bulunmamaktadır. "Yavaş yemek yemelisin" tavsiyesi bilimsel bir temele dayanmayabilir. Bununla birlikte; kombine çok kanallı intraluminal impedans ve pH ölçümü yapılarak, non-asit ve zayıf asit reflüler değerlendirilmelidir*

Anahtar kelimeler: Gastroözofageal reflü, intraözofageal pH, yemek yeme hızı

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INTRODUCTION

The gastroesophageal disease (GERD) is a chronic disease, common in Western countries as well as in Turkey. About 20% of adult population complain of gastroesophageal reflux symptoms (1). The management of the disease aims to relief the symptoms and to heal endoscopic esophagitis. The advice regarding diet and lifestyle changes is a traditional recommendation (2). The lifestyle modifications include reducing body weight, high head position of the bed, avoiding some foods which increase the risk of reflux (3,4). It is well known that gastroesophageal reflux is common in the postprandial period with the contribution of different pathogenic factors. The studies which evaluated the effect of calories and fat on gastroesophageal reflux are controversial. One study on healthy volunteers showed that high-calorie meals, but with balanced fat component, produced more reflux than low-calorie ones (5). Moreover, fatty meal does not influence GER significantly. On the contrary, in further study, Pehl demonstrated that the increase in the caloric value of a meal does not have a significant impact on GER (6).

It is a popular belief that fast eating affects the gastrointestinal tract. The influence of food intake on gastroesophageal reflux was observed only in healthy volunteers by using multichannel intraluminal impedance (7), which allows revealing the acid, weakly acid, and nonacid reflux events. The number of reflux episodes in 2 postprandial hours after 5 minutes and 30 minutes of eating periods were compared. It was demonstrated, that rapid food intake predominantly increases the number of nonacid reflux events.

Since data from patients with GERD is lacking, we aimed to compare the effect of slow and fast eating on gastroesophageal reflux attacks and symptoms in patients with GERD.

MATERIAL and METHODS

Patients referred for 24-h intraesophageal pH monitoring and for having heartburn and/or regurgitation once a week or common were evaluated. Pregnant women and patients with previous surgery on the upper gastrointestinal tract, with primary esophageal motility disorders, eating problems with any reason (psychiatric disorders, mechanical problems, etc.), and with suspicion of malignancy were excluded. Patients who could not complete their meal for up to 14 minutes were also excluded. A total of 60 patients were included (39 women; 18-68 years old; mean age 43,5±10,8 years). All patients were off acid-suppressive therapy at least for 10 days. Prior to the pH monitoring, all patients filled out a detailed GERD questionnaire validated for Turkish (8) and GERD quality of life questionnaire. Esophageal manometry was performed to evaluate the upper margin of the lower esophageal sphincter (LES) and to eliminate any esophageal motility disorders in all cases. The intraesophageal pH was monitored for approximately 28 hours by using standard double probe pH catheter (Alpine Biomed). The probe was inserted intranasally under local anesthesia and placed 5 cm above the LES, the proximal electrode was located 15 cm from distal. The signals from the electrodes were recorded at the portable recording system (Orion, MMS Inc., The Netherlands) and analyzed with software (version 8.3 g, June.20.2005). One hour after placing the probe, all subjects were asked to eat the same standard meal within 5-10 or 25-30 minutes at the noon time in a random order for two consecutive days without extubating the catheter. All eating periods were observed and time of the completion of the meal was recorded by the research team. The patients were instructed not to eat and lie down 3 hours after each meal (9) and to refrain from vigorous physical activity (10). The composition of meal was balanced according to the energy value 744 kcal: 37,6% of carbohydrate, 21,2% of protein and 41,2% of fat, and consisted of double cheeseburger, 100 g yogurt, 1 banana, 200 ml of water. All patients were instructed to continue their regular daily activity. Following the second-day meal and 3 hours of measurement period, the catheter was removed, and the data were transferred into computer and analyzed by another investigator who was blinded for the speed of the intake of the meal. The 28-hour monitoring was also evaluated, and the patients were divided according to the normal or pathologic long-term measurement. DeMeester score less than 14,72 and pH<4 less than 4% of the total measurement period were accepted as normal.

Three-hour postprandial period was chosen for the analysis after two different speeds of eating periods. The drop of pH below 4 lasting for more than 5 sec was accepted as an acid reflux. We focused on number of reflux attacks and total reflux time measured in minutes and percentage. A manual analysis in addition to automatic software analy-

sis was performed. Artifacts were detected and cleaned. In addition to the three hours of total measurement, every hour up to three hours following the meal was also analyzed. Data was loaded to the SPSS software and was compared using the paired student's t-test; p<0,05 was accepted as the significant level.

RESULTS

The mean consumption time of the standard food was 8,4±2,4 min (median 9) for fast eating and 27,7±4,0 min (median 30) for slow eating. According to the results of 28-h pH monitoring, 38 patients had normal pH results and 22 patients had pathologic pH monitoring.

All patients were evaluated and no difference was observed either in the number of reflux events or in the total reflux time within the three hours of postprandial study period (Table 1). The results revealed that especially the first hour for patients with slow eating and the second and third postprandial hours for those with fast eating were compatible with more acidic reflux attacks without reaching the significance. When only the 22 patients with pathologic 28-hour intraesophageal pH-monitoring were taken into consideration, similar results were achieved.

During the observed two postprandial periods, the total number of reflux events in all patients with

normal pH monitoring was 105, 117, 75 (total 297) within the first, second and the third hours consecutively for fast eating compared to 92, 88 and 70 (total 250) for slow eating (p>0.05) (Table 2). When we divided all subjects into two groups according to the gender or the presence of hiatal hernia, still no difference was observed.

Symptom analysis

We analyzed the symptoms (heartburn or regurgitation) during a total of 3 hours after each meal. In all patients, the number of symptoms after slow food intake was insignificantly higher compared to fast eating. The results were similar when the patients were divided according to the results of 28-h pH monitoring, i.e. presence of pathologic vs. normal findings (Figure 1).

Eight patients complained of heartburn only, 10 patient had regurgitation, and 42 had both symptoms for a period of 6 months to 20 years. Additionally, 23 had cough or laryngopharyngeal reflux symptoms. There were 5 patients with asthma.

Upper gastrointestinal endoscopy was performed in 53 cases. When the patients were divided according to the endoscopic findings (13 cases with erosive vs. 40 patients with non-erosive endoscopy, one case with short segment Barrett esophagus was not included), still no difference was observed in the effect of speed of food intake on reflux attacks or symptoms. Thirteen cases (24,5%) with

Table 1. The effect of fast and slow food intake on reflux attacks at all patients (p>0.05 for all comparisons)

	Total number of reflux events (mean)		Total reflux time, min (mean)	
	Fast eating	**Slow eating**	**Fast eating**	**Slow eating**
1st postprandial hour	249 (4,2)	254 (4,2)	297 (5,0)	317 (5,3)
2nd postprandial hour	272 (4,5)	241 (4,0)	392 (6,5)	330 (5,5)
3rd postprandial hour	194 (3,2)	173 (2,9)	318 (5,3)	220 (3,7)
Total 3 hours	715 (11,9)	668 (11,1)	1007 (16,8)	866 (14,4)

Table 2. The comparison of impact of fast and slow food intake on patients with pathologic pH monitoring (p>0.05 for all comparisons)

	Total number of reflux events (mean)		Total reflux time, min (mean)	
	Fast eating	**Slow eating**	**Fast eating**	**Slow eating**
1st postprandial hour	144 (6,5)	162 (7,4)	208 (9,5)	240 (10,9)
2nd postprandial hour	155 (7,0)	153 (7,0)	276 (12,5)	246 (11,2)
3rd postprandial hour	119 (5,4)	103 (4,7)	232 (10,5)	141 (6,4)
Total	418 (19,0)	418 (19,0)	716 (32,5)	627 (28,5)
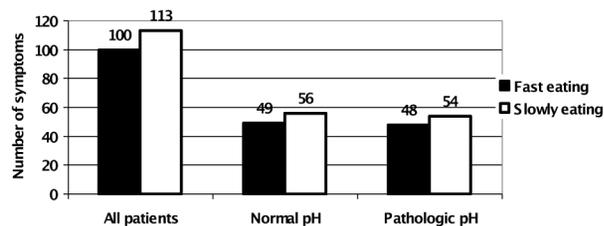
Figure 1. The number of symptoms of patients after fast and slow eating.

erosive esophagitis (7 cases with Los-Angeles A and 6 cases with Los-Angeles B) had 215 reflux attacks with fast eating and 252 attacks with slow eating. The number of symptoms was also not significant: a total of 35 symptoms with slow eating and 29 symptoms with fast eating within 3 hours following the meal.

DISCUSSION

We compared the effect of the speed of the food intake on reflux attacks measured by intraesophageal pH monitoring three hours following the standard meal in patients with GERD. No significant difference was shown between the parameters (number of reflux episodes, time of reflux attacks, number of symptoms namely heartburn or acid regurgitation) obtained from patients with fast eating (5-10 minutes) compared to those with slow eating (25-30 minutes).

There is a general belief that GERD patients should eat slowly. However, only one study addressed this issue using a new technique, i.e. combined multichannel intraluminal impedance and pH, to measure acid, weakly, acid and nonacid gastroesophageal reflux. Wildi et al demonstrated that there was a different effect of fast meal on nonacid reflux appearance, which could not be registered by traditional pH-monitoring in healthy volunteers. However, the study showed that fast eating is associated with increase of nonacid reflux during 2 postprandial hours (7). We preferred to evaluate a longer time frame (3 hours) in patients with GERD, not in healthy subjects. One possible explanation for these differences might be related with the composition of the postprandial refluxate in patients with GERD and healthy controls (11). GERD patients had significantly more acidic and health controls had mainly nonacidic reflux. Still,

since 24-h intraesophageal pH monitoring can measure only acid attacks, it is difficult to compare these studies.

Studies mainly focused on the effect of meal on reflux attacks and possible mechanisms. Most reflux episodes which appear in the postprandial period are possibly related to the transient relaxation of the lower esophageal sphincter (tLESR) (12). In patients with GERD, tLESR is more frequent, however its cause is still unclear. It is supposed, that impaired gastric emptying results in gastric distension or inflammation of the gastric mucosa thus may be responsible for the increase in the frequency of transient relaxation (13). The gastric emptying is delayed or postponed when fatty meal is consumed. However, this finding was not supported by Pehl et al (14) when they compared low-fat (10%) vs. high-fat (50%) meal and measured both the frequency of tLESR and fraction time pH<4 in healthy subjects. Sun et al also showed that meals with high fat content increase the frequency of tLESR, the number of reflux events and their duration in patients with GERD, particularly 2 hours after meal (15), which finding is in concordance with other studies (9). Some conflicting results about the content of the meal were also published. Fox et al showed that the severity of esophageal acid exposure was related to the calories of the meal, however, fat content was the main determinant of the frequency of symptoms (16). Interestingly, high-fat diet did not have any effect on esophageal acid exposure time compared to low-fat diet with catheter–free Bravo pH measurement equipment. We preferred a meal with 41.2% of fat and achieved similar results that reflux attacks had been observed mainly at the second postprandial hour. The number of reflux events and reflux time were the least at the third hour.

According to the results of our study, we can conclude that speed of food intake has no impact on acidic reflux attacks in patient with GERD. The classical advice "eat slowly" may not have any scientific basis. However, we could not measure the weak and nonacid reflux events and they might change related with the speed of eating. A similar study on patients with GERD should be performed by combined multichannel intraluminal impedance and pH to evaluate the place of nonacid and weak acid reflux.

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