Sensitive response to ingestion of lipids in dyspepsia

To the Editor,

We read with interest the study published by Diella et al [1], regarding the chemical composition and texture properties of different almond varieties, and their influence on the individual sensory perception and gastrointestinal motility. The authors showed that differences in food composition including lipids might be associated with changes in gastrointestinal motility. We want to present herewith our pilot study aiming to characterize gastric accommodation and sensitive response to ingestion of lipids.

Gastric perception is initiated by the stimulation of tension receptors located in the mucosa [2]. The sensory input is modulated by various mechanisms at different levels of the gut-brain axis [3]. Lipids have been shown to sensitize mechanoreceptors response: lipid administration increases the perception of gastric distension [4]. Functional dyspeptic patients exhibit also abnormal response of the abdominal wall (diaphragmatic contraction and anterior wall relaxation) as response to meal ingestion [5].

The drink test has been developed as a noninvasive method to evaluate perception and gastric accommodation at different volume loads [6]. It turned out to be an attractive method to detect gastric accommodation dysfunctions and efficient to estimate how nutrients may influence it [7].

Starting from the hypothesis that ingestion of lipids induces a local response at gastric level (gastric accommodation) and a sensitive response (conscious sensations), we looked for these responses in relation to lipids, using the test drink.

Chronic dyspeptic patients: 15 with functional dyspepsia (FD), 11 with chronic pangastritis (CG), and 12 healthy subjects, were checked with the Short-Form Nepean Dyspepsia Index after informed consent.

We used two drinks: Drink 1: Fresubin with 6.7 g/100mL lipids content (Fresenius Kabi Deutschland GmbH, Bad Homburg, 150 kcal/100mL, 380 mOsm/L) and Drink 2: Water with 0 g/100mL lipids content, as a standard to compare with. Each of the two drinks was administrated orally at a rate of 40 mL/min until the participants reported maximum of one of the tested symptoms. Perception measurement was made every five minutes during administration and for the next 30 minutes of the recovery period, by using independent scales
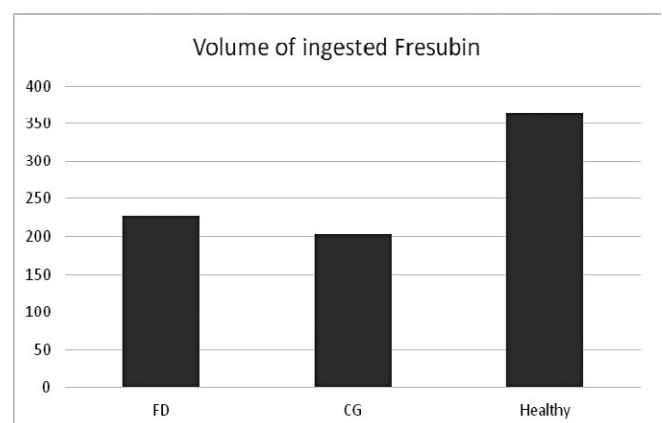

Fig. 1. Patients with functional dyspepsia (FD) tolerated lower volumes of Fresubin compared to healthy subjects (p= 0.040), patients with chronic gastritis (CG) tolerated lower volumes of Fresubin compared to healthy subjects (p= 0.004). There is no statistically significant difference of ingested volumes of Fresubin between patients with FD and CG.

graded for scoring: general abdominal symptoms; satiety; fullness; bloating and nausea. Results are displayed in Fig. 1.

Lipid meal ingestion induced a fullness sensation at a lower volume load in FD patients (227.86 ± 13.37 mL) compared to healthy subjects (364.17 ± 24.49 mL) with a statistically significant difference (p= 0.040). The difference was also statistically significant (p= 0.004) between the CG patients (202.73 ± 12 mL) and healthy subjects (364.17 ± 24.49 mL). Satiety sensation persisted longer and the recovery was slower after lipid-meal ingestion in FD (25 ± 0.85 minutes) with a statistically significant difference compared with healthy

subjects (14 ± 1.28 minutes) (p= 0.010). But the difference between CG patients (23 ± 0.55 minutes) and healthy subjects (14 ± 1.28 minutes) was not statistically significant (p= 0.101).

In conclusion, in both functional dyspeptic and chronic gastritis patients a lower volume lipid load was tolerated compared to healthy subjects. Our study confirmed that lipid containing meals might influence motility and symptoms of the digestive tract.

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Conflicts of interest: None.

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Reply,

We thank Dr. Pop and Dr. Muresan for quoting our paper recently published in JGLD [1] on the effects of two almond cultivars on agreeability and gastrointestinal motility in healthy subjects. Their letter allows us to point out some essential aspects of our study.

Our research originated because of the potential beneficial effects of nuts, including almonds (containing n-3 polynsaturated fats) on human health [2, 3]. A recent Spanish study (PREDIMED) looked at supplementation of the Mediterranean diet with 30 g daily of mixed nuts (7.5 g of almonds) in people

with a high cardiovascular risk. The intervention lowered total cholesterol, LDL-cholesterol and triglycerides, while decreasing the incidence of major cardiovascular events compared to subjects assigned to a reduced-fat diet [4]. We also wished to align the results of our study to the rural Apulian habit to enrich the daily "Mediterranean" diet with a specific local almond cultivar. Due to current market policy, we decided to compare the exclusive native "Filippo Cea" cultivar vs. the imported "Californian Carmel" cultivar (less expensive and widely available in supermarkets). To achieve this goal, we performed a chemical and texture analysis of almonds, and 60 subjects participated in the systematic sensory evaluation based on visual-analogue- and semi-quantitative scales to record several domains of smell, taste, chewing texture and visual perception with two almond cultivars. To describe the overall kinetic effects of almonds on the gastrointestinal tract, in another 24 additional subjects we simultaneously measured the time-dependent changes in the dilatation/emptying of gastric antrum and gallbladder volume emptying by functional ultrasonography, and the small intestinal transit (orocecal transit time, OCTT) by H2-breath test, up to 3 hrs following distinct meals. The standard liquid test meal (215 mL) consisted of 200 mL Nutridrink® (Nutricia, Milano, Italy) with 11.6 g (19%) fat, 300 kcal and 15 mL liquid lactulose (10 g) as Lattulac® (SOFAR, Trezzano Rosa, Milan, Italy), as previously reported by our group in a number of studies [5]. The almond mixed test meals (215 mL) consisted of 24 g (n=12) almonds, 175 mL water and 15 mL lactulose with an estimated fat content of 13.5 g ("Filippo Cea" cultivar) and 11.8 g ("Californian Carmel" cultivar). Subjects ingested each meal randomly on three different days, at room temperature, and over one min. Thus, the three meals were isovolumetric and contained almost comparable amounts of fat, with a slight prevalence (i.e., 2 g) for the Filippo Cea cultivar. Indeed, Nutridrink resembles the test meal used by Pop and Muresan (200 mL Fresubin, 6.7 g fat/100 mL), used as a drink test to monitor perception and gastric accommodation at different volume loads.

In our study, we observed distinct effects of the meals with respect to gastrointestinal motility. In the stomach, both almond meals caused a similar fast and more evident antral dilatation, as compared with the liquid Nutridrink (i.e. about 14 cm² almonds vs. 11 cm² Nutridrink). The "mass effect" of the mixed almond meals on antral walls, likely explains this finding. Although extent and timing of gastric emptying were comparable between all meals, the overall postprandial area-under-antral emptying curve tended to be greater and emptying slower with the Filippo Cea rather than the Carmel cultivar. The slightly increased fat content in the Filippo Cea cultivar can partly explain this latter effect.

In their letter, Pop and Muresan pointed to the diagnostic value of the lipid test meal and suggested that lipid-containing meals may influence motility and symptoms of the digestive tract. In our study, perceptive features were partly different between almond cultivars. None of the isovolumetric meals in the range of 12-13.5 g fat, however, induced symptoms of dyspepsia, early satiety or bothering abdominal distension. This finding is likely due to the low volume employed (215 mL) and to the features of the study group, i.e. all healthy subjects without evidence of previous or current

gastrointestinal disturbances. The relatively short-term duration of the follow up (3 hours), moreover, impeded a full evaluation of the satiety feeling before next meal ingestion. Pop and Muresan show that healthy subjects ingested up to 350 mL (=23.5 g fat), while patients with dyspepsia or chronic gastritis tolerate up to 200-220 mL (=13.4-14.7 g fat) Fresubin before symptoms appear. Data also confirm that both stomach and gallbladder "sense" even small differences in fat content of isovolumetric meals, and that the Filippo Cea cultivar shows the strongest effect, in this respect. In conclusion, we demonstrated that almond consumption in the range of 12-13g induces evident motility responses on the stomach, gallbladder and small intestine, without inducing dyspeptic symptoms, at least in healthy volunteers. Further studies are in progress to detect if similar beneficial effects of almond meals occur in patients with distinct functional or organic gastrointestinal abnormalities.

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