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Authors:
Antonio María Caballero Mateos, Amparo Roa-Colomo, Begoña Vidal Vílchez

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Changes in gastric emptying of digestible solids in professional cyclists: relationship with exercise intensity

Antonio M.ª Caballero-Mateos, Amparo Roa Colomo and Begoña Vidal Vílchez

Digestive Diseases Service. Hospital Clínico San Cecilio. Granada, Spain

Correspondence: Antonio M.ª Caballero-Mateos
e-mail: ogy1492@hotmail.com

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Dear Editor,

Few studies have evaluated the alterations in gastric emptying during exercise, in both sedentary controls and athletes. Almost every study is focused on the gastric emptying of liquids, but not on the gastric emptying of digestible solids (GES). Those using GES used inadequate methodologies (catheterization or meals containing barium) and obtained discordant or inconclusive results. Two were performed in sedentary controls (1) and showed an acceleration in the GES while increasing exercise intensity. A third study in marathon runners (2) did not show changes in the GES, although the baseline was accelerated in runners compared with that in controls.

We studied the GES of a meal (scrambled eggs) marked with Tc^{99} in 27 healthy sedentary controls and 19 professional cyclists (3). The maximum oxygen consumption (VO_2max), as well as the 50 % ($D_{50\,\%}$) and 75 % ($D_{75\,\%}$), were obtained as described by the UMTT protocol in cycloergometer by Léger (4). Cyclists showed a characteristic vagal state in the baseline situation, observed at a cardiovascular level (bradycardia) and with a more accelerated GES than in controls (Table 1). This is similar to that described by Carrio (2). This state disappeared as the intensity of the exercise increased in $D_{50\,\%}$ and $D_{75\,\%}$, where the GES slowed down progressively. At $D_{75\,\%}$, the value was similar to the baseline of the controls *(relative gastroparesis?).* That could be secondary to an

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increase in intestinal motility inhibitors that depend on physical activity, such as the sympathetic nervous system and/or β-endorphins.

The decreased GES in cyclists while exercising was asymptomatic. Nevertheless, the symptoms in untrained people could manifest as dyspepsia, mainly vomiting (1). These preliminary data were obtained from few subjects and therefore, studies with a higher number of cases are needed in order to confirm this observation. However, our preliminary results suggest that they could be very useful for athletes and their nutritional programs.

References

1. Horner KM, Schubert MM, Desbrow B, et al. Acute exercise and gastric emptying: a meta-analysis and implications for appetite control. Sports Med 2015;45:659-78. DOI: 10.1007/s40279-014-0285-4

2. Carrio I, Estorch M, Serra R, et al. Gastric emptying in marathon runners. Gut 1989;30:152-5. DOI: 10.1136/gut.30.2.152

3. Caballero-Plasencia AM, Muros-Navarro MC, Martín-Ruiz JL, et al. Dyspeptic symptoms and gastric emptying of solids in patients with functional dyspepsia. Role of Helicobacter pylori infection. Scand J Gastroenterol 1995;30:745-51 DOI: 10.3109/00365529509096322

4. Léger L, Boucher R. An indirect continuous running multistage field test: the University de Montréal Track Test (UMTT). Can J Sport Sci 1980;5:77-84.

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Table 1. Demographic data and GES results with different exercise intensities

GES	*Controls*	$D_{baseline}$	$D_{50\,\%}$	$D_{75\,\%}$
Nº/Sex	27/M	19/V		
Age (years)	27.6 (9.8)	22.1 (9.5)		
T_{lag}	5.76 (0.31)†	5.44 (0.24)	5.48 (0.32)	5.85 (0.29)‡
$T^{1/2}$	49.30 (15.23)†	33.51 (9.57)	35.09 (13.99)	52.55 (17.68)‡
p* < 0.05	†Controls *vs* $D_{baseline}$ ‡$D_{baseline}$ *vs* $D_{75\,\%}$			

T_{lag}: initial time of retardation in GES; $T^{1/2}$: time needed to empty the 50 % of the ingested meal; $D_{baseline}$: baseline values in resting athletes; $D_{50\,\%}$ y $D_{75\,\%}$: values in athletes while exercising, correspondent to a grade of 50 % and 75 % of the maximum oxygen consumption (VO_2max). *Wilcoxon tests and one way Anova Student's t-test.

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